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TANK CREW (M60A1) PERFORMANCE EXERCISE.(U)
NOV 79 R E O'BRIEN, J H HARRIS, W C OSBORN DAHC19-76-C-0001
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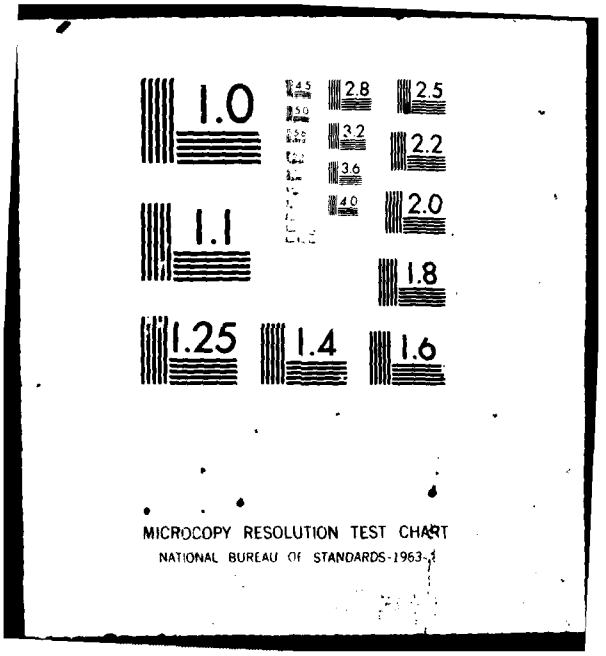
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(12)

RESEARCH PRODUCT 79-15

TANK CREW (M60A1) PERFORMANCE EXERCISE

ARI Field Unit at Fort Knox, Kentucky

NOVEMBER 1979

U.S. ARMY RESEARCH INSTITUTE for the BEHAVIORAL and SOCIAL SCIENCES

U. S. ARMY RESEARCH INSTITUTE
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document provides test exercises and administrative guidance for evaluating the readiness of M60A1 tank crews. Administrative guidance and equipment requirements for crew testing are given first. Remaining sections of the report present crew performance exercises for Preparation for Operations, and for Tactical Operations.

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The Crew Performance exercise is designed for use by unit commanders in assessing mastery of tasks requiring interaction by crew members.

When used with three companion documents, Tank Crewman (M60A1) Readiness Tests, Tank Crewman (M60A1) Training Modules, and Program Management for a Tank Crewman Skills Training Program, the crew performance exercise provides an integrated "train-up" package for annual gunnery evaluation.

RESEARCH PRODUCT RP-79-15

TANK CREW (M60A1) PERFORMANCE EXERCISE

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Department of the Army

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FOREWORD

The Fort Knox Field Unit of the Army Research Institute for the Behavioral and Social Sciences (ARI) carries out research and exploratory development in the area of Armor training. An objective of this work is to develop, through analytic and field research, tank crew training methods that are effective and efficient.

This report is one of a set of four dealing with the development and maintenance of proficiency in M60A1 tank crewman with special emphasis on application in reserve training.

Companion documents are:

1. Tank Crewman (M60A1) Readiness Tests, ARI Research Product RP- 79-13, November 1979.

2. Tank Crewman (M60A1) Training Modules, ARI Research Product RP- 79-14, November 1979.

3. Program Management for Tank Crewman Skills Training Program, ARI Research Product RP- 79-16, November 1979.

The project of which this report is a part was conducted by personnel of the Human Resources Research Organization (HumRRO) under Contract No. DAHC 19-76-C-0001 and monitored by Donald F. Haggard, Chief of ARI Field Unit at Fort Knox. The research was done under Army Project 2Q763743A773 and is responsive to requirements of the U.S. Army Armor School at Fort Knox, the Army Training and Doctrine Command, and the Army Forces Command.

JOSEPH ZEIDNER
Technical Director

SUMMARY

This report includes a performance exercise for the M60A1 tank crew. The exercise, called the Crew Interaction Performance Test (CIPT), is a method for evaluating the proficiency of individuals in a crew environment.

The CIPT represents a crew-level proficiency criterion to which Armor reserve training is targeted. It permits assessing a soldier's mastery of skills and knowledge and his ability to recognize and react to conditions which initiate task performance. The test assesses mastery of each task by the use of modules in which several tasks are imbedded, with instructions given only for performance of the first task in the module. Completion of one task then serves as the stimulus for initiation of the next task.

The performance test consists of two modules:

- Preparation for Operations. This module measures the ability of the crew to perform maintenance, disassembly and assembly of weapons, and the preparation of weapon systems for operations.

- Tactical Operations. The second module measures the effectiveness of the crew to move, shoot, and communicate in a tactical environment.

The crew interaction test is administered after crewmembers have achieved mastery of tasks required for their duty position. The execution of the test and the correction of deficiencies noted during the test will enhance a crew's ability to successfully complete the annual tank gunnery program.

The crew Interaction Performance Test provides the commander with a diagnostic tool for determining crew proficiency.

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LIST OF FIRING ENGAGEMENTS

TANK CREW (M60A1) PERFORMANCE EXERCISE

INTRODUCTION

This research product contains procedures for administering the tank crew performance exercise and the exercise called the Crew Interaction Performance Test (CIPT).

BACKGROUND

In 1977 the training needs of reserve component units were changing. The M48A1 tank was being replaced by the M48A5 tank and the draft had been eliminated. Equipment and personnel turbulence was on the increase and the cost of training related items continued to rise.

In response to the need for a new approach to reserve component training, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) initiated research to design training plans for operating and maintaining the M48A5 tank. In 1977, the Tank Crewman Skills Training Program (TCST) (Harris, Osborn, and Boldovici, 1977) was developed to accommodate the ARI requirement. The TCST program consisted of three major components.

- Crew Interaction Performance Test (CIPT)
- Duty Position Readiness Tests (DPRTs)
- Duty Position Training Modules (DPTMs)

PURPOSE

The purpose of the crew interaction performance test is to measure the proficiency of individuals in a crew environment and to determine crew proficiency.

GUIDELINES
FOR
TEST ADMINISTRATOR

This section provides guidelines for administering the crew interaction performance test. Specific items covered are:

- Standardized conditions.
- Time requirements and control measures.
- Rater preparation.
- Test interruptions.
- Tank gunnery engagements.
- Test site requirements.
- Equipment list.

STANDARDIZED CONDITIONS

Accurate assessment of tank crew combat readiness requires standardized test conditions. All personnel tested must be presented identical stimulus conditions. The test conditions described for each module of the test must be strictly adhered to. Events must occur as prescribed in the directions for establishing and administering each module.

TIME REQUIREMENTS AND CONTROL MEASURES

Time requirements listed in module descriptions are approximations. The time required to conduct the test, particularly Module II, will vary with the terrain. A dry run of the course to determine a realistic maximum time to conduct the Tactical Operations Module is necessary before the test is administered. Each crew must be allowed the maximum time to complete each module. Some crews may complete a module in less than the maximum time; however, no crew may take more than the maximum time. The maximum time for the module is:

- Module I 2 hours
- Module II 1 hour

Control measures for Tactical Operations, in the form of clearly identifiable objectives, boundaries, and check points must be included as required to aid adherence to a time schedule.

RATER PREPARATION

The raters are the key to a successful test. Rater responses must not be left to chance and every effort must be made to minimize rater subjectivity. The key to good rating lies in rater motivation and familiarity of raters with the test as conducted "on the ground." It is necessary that raters have at least one walk through and one actual run prior to their first scored run. The test administrator must frequently spot check the raters to insure objectivity and continuity.

The raters must know tank crew requirements, the procedure for each test item, the purpose of the test, and the mechanics of evaluation. Raters must be prepared in advance and given a briefing on the subject matter they are to rate. They should understand the importance of their duty, the need for objectivity, and the requirement for test security. Raters must be provided reference materials such as FMs, TMs, job aids, and copies of pertinent unit SOPs.

TEST INTERRUPTIONS

It is recognized that events will occur that are not listed as test items. These may include minor equipment failures and reaction to events not planned for testing. These interruptions must not be treated administratively. If a serious event such as equipment breakdown occurs, the test should be terminated until the situation is corrected. A new order should be given starting the test where it stopped.

TANK GUNNERY ENGAGEMENTS

There are seven live-fire engagements during the test; five during daylight hours and two during hours of darkness. During daylight firing two are main gun (TELFARE) multiple engagements, one is a simultaneous main gun (TELFARE) and caliber .50 engagement, one is a simultaneous coax and caliber .50 engagement, and one is a main gun (TELFARE) engagement. The night firing consists of one simultaneous main gun (TELFARE) and caliber .50 engagement, and one main gun (TELFARE) multiple engagement.

TEST SITE REQUIREMENTS

Sufficient terrain must be available to provide a 4-6 KM course. The course must have several natural or man made obstacles of each of the following types: vertical obstacles (fallen trees, rocks, etc.), ditches, hills, and water obstacles. Obstacles should represent a range of difficulty including some that cannot be negotiated. Terrain should also provide features such as ridge lines suitable for tank defilade. Simulated targets should be provided which meet the conditions of the firing engagements.

The test administrator of the crew interaction performance test will encounter requirements for control and test standardization that are not present in other crew test situations. Adherence to these guidelines during the preparation and conduct of the test will prevent uncontrolled conditions from developing and increase the reliability of combat readiness assessment.

EQUIPMENT LIST

Table 1 indicates the minimum amount of equipment, materials, supplies, and personnel required to conduct the test. Local conditions may require more or different support material. Basic issue items (BII) are those items listed in the vehicle TM. Medical, administrative, clerical, mess, and control support will be determined by the unit tactical SOP and are not listed.

NOTE: A companion research product, "Program Management for Tank Crewman Skills Training Program," explains in detail the development of the program and provides implementing guidance for training managers and trainers.

TABLE 1

MATERIAL REQUIREMENTS

Test Crew

M60A1 with BII, radio, M219 coaxial and M85 machinegun

Individual weapons

Ammunition (does not include zeroing ammunition)

150 rd. per M85 machinegun

100 rd. per M219 coaxial machinegun

23 rds. main gun (TELFARE, Caliber .50 MG, Tracer)

Binoculars

Flashlight with filter

Map 1:50,000

Unit SOP

Protective mask

CEOI Extract

Uniform, seasonal combat

Raters

Binoculars

Protective mask

CEOI Extract

Rating sheets, Modules I and II

Script for operation order

M60A1 Technical Manual

Map 1:50,000

Unit SOP

Other Support

Boresight panels (Module I)

Zeroing panels (Module I)

Main gun engagement targets (Module II)

Machinegun engagement targets (Module II)

Noise devices (empty shell casings, artillery simulator) (Module II)

CREW INTERACTION PERFORMANCE TEST

The Crew Interaction Performance Test (CIPT) consists of two modules: Module I, Preparation for Operations and Module II, Tactical Operations. The modules are at Appendixes A and B.

Each module consists of guidelines for administering the module, appropriate diagrams, list of required materials, list of individual and team tasks, rating sheets, and score cards as appropriate.

PREPARATION FOR OPERATIONS MODULE

This module measures a tank crew's ability to prepare for tactical operations. The module includes, in addition to the items listed common to both modules, a schematic diagram of the test site and a copy of an oral operation order.

TACTICAL OPERATIONS MODULE

This module measures a tank crew's ability to move, shoot, and communicate in a tactical environment. The module includes, in addition to the items common to both modules, schematic diagrams of day and night firing courses and firing notes for tactical operations.

REFERENCES

Harris, J.H., Osborn, W.C., and Boldovici, J.A. Reserve Component Training for Operating and Maintaining the M48A5 Tank. Alexandria, Virginia: U.S. Army Research Institute for the Behavioral and Social Sciences (ARI), 1977.

APPENDIXES

APPENDIX A

MODULE I

PREPARATION FOR OPERATIONS

MODULE I: PREPARATION FOR OPERATIONS

OBJECTIVE: To determine whether the tank crew can perform maintenance, disassembly and assembly of weapons, and preparation of systems for tactical operations.

PROCEDURE: The rater will initiate activities by issuing an oral order to the Tank Commander. The oral order will be such that each crew is part of a platoon conducting an attack. The Tank Commander will formulate his plan for accomplishing the mission and issue on oral warning order to his crew covering:

1. The actions necessary for preparing for the mission.
2. The planned conduct of the mission.
3. Directing his crew to proceed to the weapons test fire area.

The crew will then prepare the vehicle, themselves, weapons, radios, and other equipment for the mission. The Tank Commander should spot-check performance of preoperations in which he does not assist, and make a final determination that the crew is ready.

CONDITIONS: 1. The module will be administered during daylight and darkness.

2. All equipment and ammunition will be issued and the vehicle will be in tactical configuration as required by the unit SOP.
3. A live fire area will be provided for zeroing.

RATER ACTIVITIES: The rater will also function as the platoon leader throughout the test. He must observe each phase of the operations on the attached checklist. The rater must not question crew members, indicate the ratings that are being given, or prompt crew members in any way.

PERFORMANCE ASSESSMENT:

1. Crew members may follow the TM in performing preoperation maintenance checks and services.
2. Operational checks must be performed on all weapons. The weapons must be clean and lubricated,
3. A ground guide will be used when moving the vehicle within the assembly area.
4. Weapons must be properly boresighted and zeroed.
5. Activities must be completed within two hours of issue of the oral order.

ATTACHMENTS:

Schematic diagram, Module I

Initial Oral Order

Rating sheets, Module I

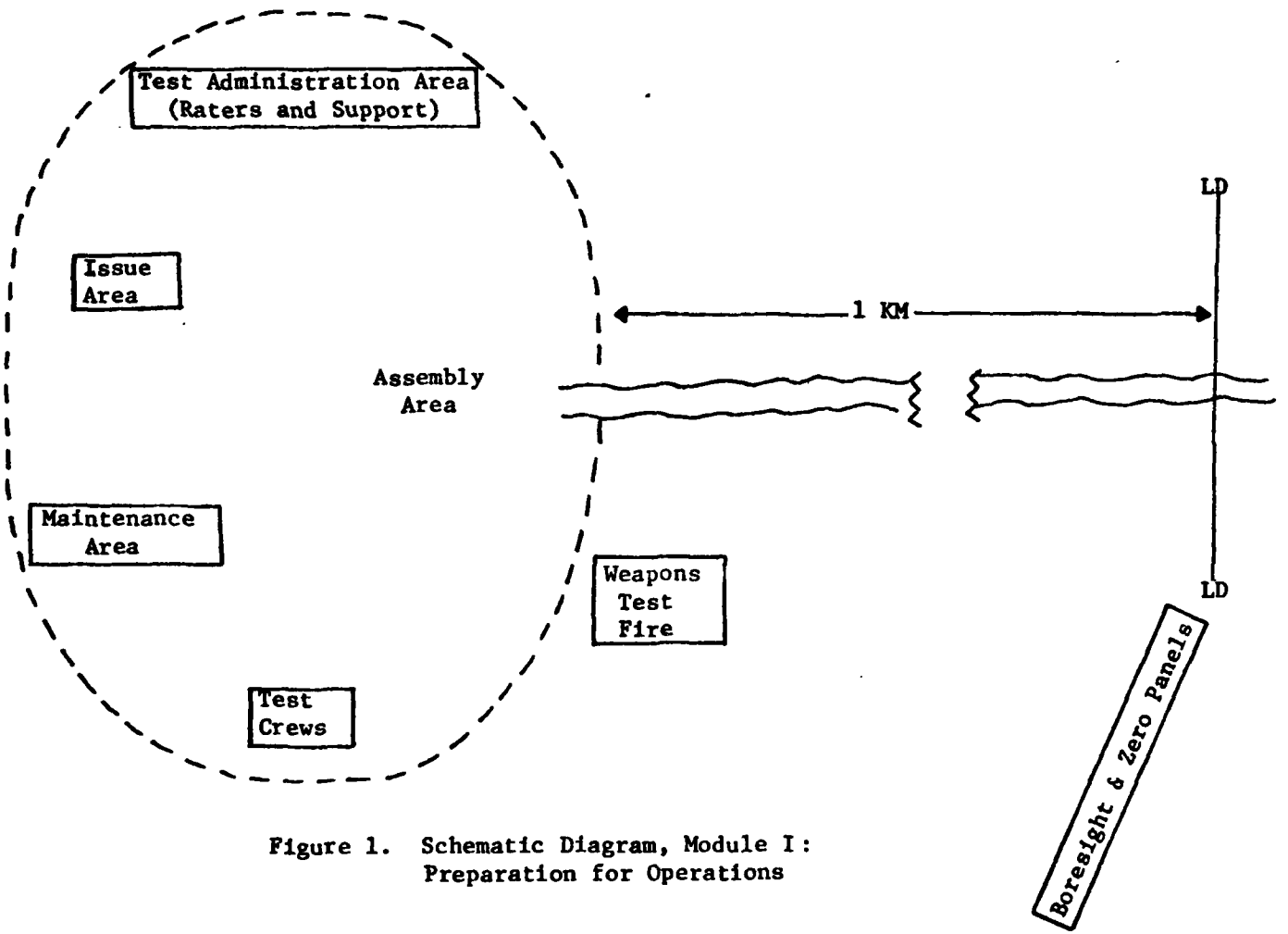


Figure 1. Schematic Diagram, Module I:
Preparation for Operations

INITIAL ORAL WARNING ORDER

"The platoon is an interior platoon in the company formation and has been ordered to resume the offensive by attacking to seize and secure objective ALFA defended by a small force in hasty defensive positions. Intelligence reports that enemy forces are using T54 and T62 tanks, motorized infantry armed with SAGGER missiles, RPGs, and other armor-defeating weapons. Your tank is the center tank of the platoon.

Be prepared to continue the operation on order. Make sure you complete maintenance and other preparations on your tank before you move out. Move to the weapons test fire area to boresight and zero.

Submit all reports to me. Current CEOI remains in effect. We will cross the LD at _____; time is now _____ . Any questions?"

PREPARATION FOR OPERATIONS

LOADER

1. Perform before-operations maintenance checks and services on engine and transmission oil levels.
2. Check track tension.
3. Adjust track tension.
4. Stow main gun ammunition.
5. Stow machinegun ammunition.
6. Stow coax ammunition in ready (banana) box.
7. Disassemble M219 machinegun.
8. Assemble M219 machinegun.
9. Disassemble breechblock.
10. Assemble breechblock.
11. Install and operate AN/VRC-12 or AN/VRC-64 radio.
12. Operate tank intercommunications system.
13. Perform prepare-to-fire procedures.
14. Prepare tank for boresighting.
15. Boresight Gunner's telescope and apply established zero.

DRIVER

1. Perform before-operations maintenance checks and services on engine and transmission oil levels.
2. Perform before-operations maintenance checks and services on the M24 (IR) and M27 periscopes.
3. Place tank in motion.
4. Check track tension.
5. Operate tank intercommunications system.
6. Perform prepare-to-fire procedures.
7. Prepare tank for boresighting.

Figure 2. Tasks performed by each crew member during Module I: Preparation for Operations

PREPARATION FOR OPERATIONS

LOADER

16. Boresight daylight sight of Gunner's periscope and apply established zero.

17. Boresight IR sight of Gunner's periscope and apply established zero.

18. Boresight rangefinder with main gun axis alined on an aiming point at 1200 meters.

19. Boresight M219 machinegun.

20. Load M219 machinegun.

21. Zero M219 machinegun.

22. Clear and unload M219 machinegun.

23. Change M219 machinegun barrel.

24. Load main gun.

25. Zero main gun.

Figure 2 (Cont'd.). Tasks performed by each crew member during Module I: Preparation for Operations

PREPARATION FOR OPERATIONS

TANK COMMANDER

1. Disassemble M85 machinegun.
2. Assemble M85 machinegun.
3. Operate tank intercommunications system.
4. Perform prepare-to-fire procedures.
5. Prepare tank for boresighting.
6. Prepare rangefinder for operation.
7. Boresight rangefinder with main gun bore axis alined on an aiming point at 1200 meters.
8. Determine range to target with rangefinder.

*9. Boresight searchlight using primary method.

10. Boresight searchlight using alternate method.
11. Boresight M85 machinegun.
12. Zero M219 machinegun.
13. Load M85 machinegun.
14. Zero M85 machinegun.
15. Clear and unload M85 machinegun.

GUNNER

1. Operate tank intercommunications system.
2. Place turret into power operation.
3. Perform prepare-to-fire procedures.
4. Prepare tank for boresighting.
5. Prepare Gunner's telescope for operation.
6. Prepare Gunner's periscope for operation.
7. Prepare azimuth indicator for operation.
8. Operate elevation quadrant.
9. Index ammunition into computer and perform computer test.
10. Boresight Gunner's telescope and apply established zero.
11. Boresight daylight sight of Gunner's periscope and apply established zero.
12. Boresight IR sight of Gunner's periscope and apply established zero.
13. Boresight M219 machinegun.

*14. Boresight searchlight using primary method.

Figure 2. (Cont'd.). Tasks performed by each crew member during Module I: Preparation for Operations

PREPARATION FOR OPERATIONS

TANK COMMANDER	GUNNER
16. Zero main gun.	15. Boresight searchlight using alternate method.
	16. Zero M219 machinegun.
	17. Zero main gun.

*Conducted during darkness.

Figure 2. (Cont'd.). Tasks performed by each crew member during Module I: Preparation for Operations

PERFORM BEFORE-OPERATIONS MAINTENANCE CHECKS AND SERVICES ON TANK ENGINE AND TRANSMISSION OIL LEVELS [DRIVER/LOADER].

	Yes	No	NA
Loader . Check engine and transmission oil levels.	___	___	___
Loader . Add engine oil until level indicated on gage is to the ADD mark.	___	___	___
Loader . Add transmission oil until level indicated on gage is to the ADD mark.	___	___	___
Loader . Tell Driver to start engine.	___	___	___
Driver . Set parking brake and start tank engine.	___	___	___
Driver . Idle engine between 1000-1200 RPM for 5 minutes.	___	___	___
Driver . Reduce engine idle to 700-750 RPM.	___	___	___
Loader . Add or drain engine oil until level indicated on gage is to the FULL mark.	___	___	___
Loader . Add or drain transmission oil until level indicated on gage is to the FULL mark.	___	___	___

PERFORM BEFORE-OPERATIONS MAINTENANCE CHECKS AND SERVICES ON THE M24 (IR) PERISCOPE AND M27 PERISCOPE [DRIVER]

	Yes	No	NA
. Inspect the M24 IR periscope and spare head for cracked or dirty lenses and completeness.	___	___	___
. Install the periscope without exposing it to direct sunlight.	___	___	___
. Energize the IR power.	___	___	___
. Allow 5 minutes for the system to warm-up and then focus on an image using the focus controls.	___	___	___
. Record on DA Form 2404 any damage or unserviceable parts detected or the inability to focus the M24 (IR) periscope.	___	___	___
. Inspect M27 periscope and spare for cracks and dirty lenses.	___	___	___
. Clean dirty lenses.	___	___	___
. Record on DA Form 2404 any damaged lenses on the M27 periscope.			

PLACE A TANK IN MOTION [DRIVER]

	Yes	No	NA
. Lock the Driver's hatch in either the open or closed position.	___	___	___
. Tell crew members to secure hatches in the open or closed position.	___	___	___
. Turn on appropriate lights.	___	___	___
. Depress accelerator to disengage the accelerator lock.	___	___	___
. Release accelerator.	___	___	___
. Depress brake pedal and move transmission shift lever to NEUTRAL when the engine idle speed is 700-750 RPM.	___	___	___
. Release parking brake.	___	___	___
. Maintain pressure on brake pedal and move transmission shift lever to LOW.	___	___	___
. Release brake pedal and depress accelerator slowly.	___	___	___

CHECK TRACK TENSION [DRIVER/LOADER]

	Yes	No	NA
Loader . Direct Driver to coast to a stop so that a track link is continued on the #3 support roller.	___	___	___
Driver . Move vehicle forward on a level hard surface and when directed, coast to a stop without applying brakes.	___	___	___
Loader . Raise the track with a crowbar, at the number three support roller and place a block (1" thick by 6" square) between the number three support roller and the track link.	___	___	___
Loader . Measure the clearance between the bottom of the track and the top of the number two support roller: Acceptable clearance is 1/4 to 1/2 inch.	___	___	___

ADJUST TRACK TENSION [LOADER]

	Yes	No	NA
. Remove the track and adjusting link screw and washer from the top of the track adjusting link.	___	___	___
. Use the track adjusting wrench on the track adjusting link and pull up to increase track tension (right side) and push down to decrease track tension (right side). (Reverse directions for the left side). [Track adjusting link must not be extended beyond the red painted groove.]	___	___	___
. Adjust track tension to 1/4-1/2 inch in tolerance.	___	___	___
. Install lockwasher and lockscrew and tighten with wrench. Lockscrew must tighten until it is fully seated on the shoulder.	___	___	___

STOW MAIN GUN AMMUNITION [LOADER][1]

	Yes	No	NA
. Determined, by reference to Ammunition Stowage Plan and present load, how many of each type of round in needed.	___	___	___
. Called out to assisting crewman how many of a given type of round is wanted.	___	___	___
. Insisted that round be handed in through turret nose down.	___	___	___
. Round stowed in:			
- Ready rack by placing primer end down, swinging hinge of holder up and to left, pulling out spring loaded knob on rod of holder, sliding hinge slot over rod behind knob, and releasing the knob.	___	___	___
- Tubular stowage rack by pushing round in nose first, swinging handle lock over primer end of round, and rotating handle lock securely in place.	___	___	___
- Turret bustle by seating round with nose toward inside of turret, swinging hinge up and to left, pulling up clamp and slotting hinge in place below clamp, and pulling clamp down.	___	___	___
. Completed stowage of rounds one type at a time.	___	___	___

[1] The unit SOP supersedes the specifications detailed for this test.

STOW MACHINEGUN AMMUNITION [LOADER][1]

	Yes	No	NA
. Determined, by reference to Ammunition Stowage Plan and present load, how much of each ammunition is needed.	___	___	___
. Called out to assisting crewman how much of a given type ammunition is needed.	___	___	___
. Stowed 15 boxes of 7.62 coax ammunition on the turret platform floor. (Use cardboard representation.)	___	___	___
. Stowed 600 rounds of 7.62 coax ammunition in the ready-round (banana) ammunition box.	___	___	___
. Stowed 8 boxes of .50 caliber ammunition on the turret platform floor. (Use cardboard representation.)	___	___	___
. Stowed 180 rounds of .50 caliber ammunition in the ready-round ammunition box.	___	___	___

[1]The unit SOP supersedes the specifications detailed for this task.

STOW COAX AMMUNITION IN THE READY (BANANA) BOX [LOADER]

	Yes	No	NA
. Removed ammunition from metal packing box.	___	___	___
. Inspected ammunition for serviceability and dirt.	___	___	___
. Cleaned ammunition if required.	___	___	___
. Linked 600 rounds together in one belt.	___	___	___
. Opened ready box cover.	___	___	___
. Placed 600 round belt in ready box with projectile end of round toward turret wall.	___	___	___
. Fed at least ten rounds of ammunition through ammunition chute in ready box cover.	___	___	___
. Closed ready box cover.	___	___	___

DISASSEMBLE M219 MACHINEGUN [LOADER]

	Yes	No	NA
. Remove barrel and jacket assembly from receiver.	___	___	___
. Separate barrel from jacket assembly.	___	___	___
. Remove cover assembly.	___	___	___
. Remove feed tray.	___	___	___
. Remove guide rod springs while holding barrel extension forward.	___	___	___
. Separate guide rods from guide rod springs.	___	___	___
. Remove backplate assembly.	___	___	___
. Retract barrel assembly.	___	___	___
. Depress buffer support lever and remove barrel extension.	___	___	___
. Remove breechblock from barrel extension assembly.	___	___	___
. Remove retainer clip and charger assembly from projecting stud.	___	___	___

ASSEMBLE M219 MACHINEGUN [LOADER]

	Yes	No	NA
. Install charger assembly.	___	___	___
. Place breechblock assembly in barrel extension.	___	___	___
. Install barrel extension.	___	___	___
. Install backplate assembly.	___	___	___
. Join guide rods and guide rod springs.	___	___	___
. Install guide rod springs.	___	___	___
. Install feed tray.	___	___	___
. Install cover assembly.	___	___	___
. Join barrel to the jacket assembly.	___	___	___
. Join barrel and jacket assembly with the receiver.	___	___	___

DISASSEMBLE BREECHBLOCK [LOADER]

	Yes	No	NA
A. REMOVE BREECHBLOCK			
. Insure that the main gun safety switch is in the SAFE position.	___	___	___
. Insure that the breechblock crank stop is in the REAR position.	___	___	___
. Open the breech.	___	___	___
. Insure chamber is empty.	___	___	___
. Close the breech manually by tripping the extractors with an empty cartridge case or a wooden block.	___	___	___
. Remove firing pin spring by depressing plunger, moving plunger to the right, twisting firing pin spring retainer counterclockwise until the lug alines with the groove in the breechblock, and removing the retainer and spring.	___	___	___
. Remove firing pin and retractor guide with firing pin retractor by inserting screwdriver blade into retractor guide slot and prying outward.	___	___	___
. Screw eye bolt into the top of the breechblock.	___	___	___
. Suspend chain hoist from hook on the turret ceiling and connect chain hoist to eye bolt.	___	___	___
. Take up slack with the chain hoist to support the breechblock.	___	___	___
. Apply tension on closing spring by turning adjuster clockwise with spanner wrench.	___	___	___
. Remove tension from the closing spring by depressing plunger from its notch with a screwdriver and allowing adjuster to turn counter-clockwise under control of the spanner wrench.	___	___	___
. Insert small screwdriver into hole in breechblock crank stop and slide stop forward.	___	___	___
. Start breechblock downward by rotating operating handle rearward and down, and with the chain hoist let the breechblock begin descending.	___	___	___
. Return the operating handle to the latched position.	___	___	___
. Lower the breechblock until breechblock crank pivot is free of the T-slot and remove pivot.	___	___	___
. Lower breechblock until breechblock is on the turret floor.	___	___	___

DISASSEMBLE BREECHBLOCK [LOADER] (Continued)

	Yes	No	NA
A. REMOVE BREECHBLOCK (Continued)			
. Release chain hoist from the eye bolt.	___	___	___
. Remove right and left extractors from the breech ring.	___	___	___
B. DISASSEMBLE BREECHBLOCK			
. Depress firing contact plate plunger and turn firing contact plate, counterclockwise until arrows on plate and breechblock are alined with each other.	___	___	___
. Remove firing contact plate, firing contact plate plunger, and spring.	___	___	___
. Remove plastic washer, firing contact, and firing contact sleeve.	___	___	___
. Remove retractor pivot pin and firing pin retractor from retractor guide.	___	___	___
. Remove screw, washers, and clamp securing the retractor driver to the bottom of the breechblock. (Use Allen wrench to remove screws.)	___	___	___
. Remove retractor driver, retractor driver shaft, and spring.	___	___	___

ASSEMBLE BREECHBLOCK [LOADER]

	Yes	No	NA
A. ASSEMBLE BREECHBLOCK			
. Install retractor driver spring, shaft, and retractor driver into the bottom of the breechblock.	___	___	___
. Affix the retractor group to the bottom of the breechblock by installing securing clamp, washers, and screw with the Allen wrench.	___	___	___
. Insert firing contact sleeve, firing contact, plastic washer, spring, and firing contact plate plunger into the breechblock.	___	___	___
. Install firing pin retractor into retractor guide and secure it with the retractor pivot pin.	___	___	___
. Replace firing contact plate by alining the arrow and depressing and rotating the plate clockwise until firing contact plate plunger engages locking notch in plate.	___	___	___
B. INSTALL BREECHBLOCK			
. Install right and left extractors into extractor pivots in the breech ring.	___	___	___
. Insert chain hoist into eye bolt on breechblock.	___	___	___
. Raise breechblock and guide it into breech ring until breechblock comes in contact with extractor plungers.	___	___	___
. Depress plungers and move breechblock upward.	___	___	___
. Install breechblock crank pivot in breechblock crank.	___	___	___
. Insert pivot in breechblock T-slot.	___	___	___
. Trip extractors with the screwdriver and raise the breechblock to the closed position.	___	___	___
. Insert small screw driver or rod into the hold in breechblock crank stop and slide stop to the rear position.	___	___	___
. Jiggle the crank stop back and forth to assure that the plunger is seated in its recess.	___	___	___
. Release the tension on the chain hoist.	___	___	___
. Turn adjuster clockwise until plunger enters the first recess.			
. Remove chain hoist and eye bolt.	___	___	___
. Install retractor guide with firing pin retractor and firing pin in its well by pushing guide forward until it is flush with inner surface of the well.	___	___	___

ASSEMBLE BREECHBLOCK [LOADER] (Continued)

	Yes	No	NA
B. INSTALL BREECHBLOCK (Continued)			
. Install firing pin spring and firing pin spring retainer.	___	___	___
. Depress plunger, and twist retainer clockwise until plunger is seated in its recess.	___	___	___
. Open and close breech several times. (The action of breech should be smooth without binding or shock. If it closes either too slow or too fast, increase or decrease the tension on the closing spring.)	___	___	___

DISASSEMBLE M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Cleared the weapon.	___	___	___
. Removed the barrel.	___	___	___
. Removed the back plate group.	___	___	___
. Disengage retainer lug of guide rod.	___	___	___
. Removed bolt buffer group.	___	___	___
. Separated helical spring, buffer sleeve and spring and guide rod.	___	___	___
. Removed feed and ejector assembly.	___	___	___
. Removed sear assembly.	___	___	___
. Removed barrel extension and bolt assembly.	___	___	___
. Separated bolt assembly from barrel extension.	___	___	___
. Removed hand charger assembly.	___	___	___
. Removed accelerator quick release pin.	___	___	___
. Removed cover assembly and feed tray assembly.	___	___	___
. Separated cover assembly from feed tray assembly.	___	___	___
. Removed accelerator assembly.	___	___	___

ASSEMBLE M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Installed accelerator assembly.	___	___	___
. Replaced cover assembly on feed tray assembly.	___	___	___
. Installed cover assembly and feed tray assembly.	___	___	___
. Installed accelerator quick release pin.	___	___	___
. Installed hand charger assembly.	___	___	___
. Assembled bolt assembly and barrel extension.	___	___	___
. Replaced sear assembly.	___	___	___
. Replaced feed and ejector assembly.	___	___	___
. Assembled helical spring, buffer sleeve, and spring, and guide rod.	___	___	___
. Installed bolt buffer group.	___	___	___
. Engaged retainer lug or guide rod.	___	___	___
. Replaced the back plate group.	___	___	___
. Installed the barrel.	___	___	___
. Performed functions check.	___	___	___

INSTALL AND OPERATE AN/VRC-12 OR AN/VRC-64 RADIO [LOADER]

	Yes	No	NA
a. Install AN/VRC-12 Radio			
. Placed receiver-transmitter (RT-246) on mount (MT-1029/VRC) and tightened clamps to lock receiver-transmitter on mount.	___	___	___
. Connected antenna cable (CG-1773/U) to ANT receptable on the receiver-transmitter.	___	___	___
. Connected control cable assembly (CX-4722/VRC) to ANT CONT receptable on receiver-transmitter.	___	___	___
. Placed receiver (R-442) on mount (MT-1898/VRC) and tightened clamp to lock receiver on mount.	___	___	___
. Connected antenna cable (CG-1773/U) to ANT receptable on receiver.	___	___	___
. Assembled antenna sections and screwed bottom section into antenna base (MX-6707/VRC).	___	___	___
b. Operate AN/VRC-12 Radio			
. Told Driver to turn ON Master Battery switch.	___	___	___
. Set amplifier (AM-1780/VRC) MAIN PWR switch to OTHER.	___	___	___
. Set receiver-transmitter (RT-246) POWER switch to LOW or HIGH.	___	___	___
. Set amplifier (AM-1780/VRC) POWER CKT BKR switch to ON.	___	___	___
. Set receiver (R-442) POWER switch to ON.	___	___	___
c. Install AN/VRC-64 Radio			
. Placed amplifier-power supply (AM2060/FRC) on mount (MT-1029/VRC) and tightened clamps to lock amplifier-power supply on mount.	___	___	___
. Placed receiver-transmitter (RF-841/PRC-77) on amplifier-power supply (AM-2060/GRC) and tightened clamps to lock receiver-transmitter on amplifier-power supply.	___	___	___

INSTALL AND OPERATE AN/VRC-12 OR AN/VRC-64 RADIO [LOADER]
(Continued)

	Yes	No	NA
c. Install AN/VRC-64 Radio (Continued)			
. Connected Cable Assembly Special Purpose (CX-4655/GRC) to amplifier-power supply SET POWER connector and the receiver-transmitter POWER connector.	___	___	___
. Connected Cable Assembly (CG-1773/U) to receiver-transmitter ANT connector.	___	___	___
. Assembled antenna sections and screwed bottom section into antenna base (MX-6707/VRC).	___	___	___
d. Operate AN/VRC-64 Radio			
. Told Driver to turn ON Master Battery switch.	___	___	___
. Set amplifier-power supply (AM-2060/GRC) PWR switch to ON.	___	___	___
. Turned receiver-transmitter (RT-841/PRC-77) VOLUME control fully clockwise.	___	___	___
. Turned amplifier (AM-1780/VRC) MAIN PWR switch to NORM.	___	___	___
. Set POWER CKT BKR switch to ON.	___	___	___

(Loader will perform measures on either the AN/VRC-12 or AN/VRC-64 radio.)

OPERATE TANK INTERCOMMUNICATIONS SYSTEM [TANK COMMANDER/ GUNNER/LOADER/DRIVER]

	Yes	No	NA
. Adjusted CVC helmet to head.	___	___	___
. Insured CVC helmet radio-interphone switch was in center position.	___	___	___
. Connected interphone connector to plug at left bottom of control box.	___	___	___
. Connected radio/audio connector to plug at right bottom of control box.	___	___	___
. Placed control box Monitor switch in either the ALL, A, INT ONLY, or B position.	___	___	___
. Transmitted to TC or scorer:	___	___	___
"Driver Ready"	___	___	___
or			
"Loader Ready"	___	___	___
or			
"Gunner Ready"	___	___	___
or			
"TC Ready"	___	___	___

PLACE TURRET INTO POWER OPERATION [GUNNER]

	Yes	No	NA
. Insure that the tank and surrounding area are clear of obstructions.	___	___	___
. Insure that crew is in safe position and Driver has lowered his seat and has his head down.	___	___	___
. Tell Loader to release gun tube from travel lock.	___	___	___
. Unlock turret lock.	___	___	___
. Announce POWER to alert the crew	___	___	___
. Check that engine has been started and set at 800 to 900 RPM.	___	___	___
. Insure manual traversing handle locking lever is in the detent position.	___	___	___
. Place TURRET POWER switch in the ON position.	___	___	___
. Squeeze magnetic brake switch and rotate Gunner's control handle to traverse turret.	___	___	___
. Rotate handles rearward and forward to elevate and depress gun.	___	___	___

PERFORM PREPARE TO FIRE PROCEDURES [DRIVER/LOADER/GUNNER/TANK COMMANDER]

		Yes	No	NA
Tank Commander	. Command PREPARE TO FIRE.	___	___	___
Tank Commander	. Disconnect breakaway plug.	___	___	___
Tank Commander	. Clean exterior lens and vision devices on turret.	___	___	___
Tank Commander	. Check operation of shield on M36 periscope.	___	___	___
Tank Commander	. Check instrument lights.	___	___	___
Gunner	. Clean and inspect Gunner's direct fire sights (interior).	___	___	___
Gunner	. Check operation of ballistic shield.	___	___	___
Gunner	. Check instrument lights.	___	___	___
Loader	. Check recoil oil.	___	___	___
Loader	. Check breechblock crank stop.	___	___	___
Loader	. Inspect gun tube and chamber.	___	___	___
Loader	. Check coaxial machinegun mount and adjust solenoid.	___	___	___
Loader	. Inspect turret stowed ammunition.	___	___	___
Driver	. Lower seat and close hatch.	___	___	___
Driver	. Turn master control switch ON.	___	___	___
Tank Commander	. Command CHECK FIRING SWITCHES.	___	___	___
Tank Commander	. Check firing trigger on power control handle when main gun switch is ON and when coaxial machinegun switch is ON.	___	___	___
Gunner	. Turn main gun switch ON.	___	___	___
Gunner	. Check firing trigger on power control handle and trigger on manual control handle.	___	___	___
Gunner	. Check main gun manual firing device.	___	___	___
Gunner	. Announce ON THE WAY each time a trigger is pressed.	___	___	___
Loader	. Move gun safety switch to FIRE and insert circuit tester. (Insert cover at night to protect night vision.)	___	___	___

PERFORM PREPARE TO FIRE PROCEDURES [DRIVER/LOADER/GUNNER/TANK COMMANDER] (Continued)

		Yes	No	NA
Loader	. Observe for lighting in bulb each time trigger is pressed.	___	___	___
Loader	. Announce NO FIRE if light fails to come on.	___	___	___
Loader	. Close cover and cock coaxial machinegun and listen for the action of the barrel and barrel extension going forward when TC and Gunner check triggers.	___	___	___
Loader	. Remove and stow circuit tester.	___	___	___
Driver	. Start engine.	___	___	___
Tank Commander	. Command CHECK GUN CONTROLS.	___	___	___
Tank Commander	. Check power control handle for power elevation and power traverse.	___	___	___
Loader	. Check hull stowed ammunition.	___	___	___
Tank Commander	. Command CHECK FIRE CONTROLS.	___	___	___
Tank Commander	. Turn cupola power switch ON.	___	___	___
Tank Commander	. Check operation of caliber .50 machinegun mount and controls.	___	___	___
Tank Commander	. Check for binding on rangefinder.	___	___	___
Tank Commander	. Turn ballistic computer ON.	___	___	___
Tank Commander	. Index various ranges on range finder and tell Gunner to ensure they are indexed on ballistic computer.	___	___	___
Gunner	. Set range correction knob of ballistic computer at zero.	___	___	___
Gunner	. Check manual operation of computer.	___	___	___
Gunner	. Push RESET button on computer.	___	___	___
Gunner	. Check that pointers on computers synchronize at various indexed ranges.	___	___	___
Gunner	. Check that superelevation counter indicated correct superelevation for various ammunition and ranges.	___	___	___

PERFORM PREPARE TO FIRE PROCEDURES [DRIVER/LOADER/GUNNER/TANK COMMANDER]
(Continued)

		Yes	No	NA
Gunner	. Turn range correction knob of ballistic computer to proper setting.	___	___	___
Tank Commander	. Command REPORT.	___	___	___
Gunner	. Report GUNNER READY.	___	___	___
Loader	. Report LOADER READY.	___	___	___
Driver	. Report DRIVER READY.	___	___	___

PREPARE TANK FOR BORESIGHTING [TANK COMMANDER/GUNNER/LOADER/DRIVER]

		Yes	No	NA
Tank Commander	. Direct positioning of tank on level ground.	___	___	___
Driver	. Position vehicle on level ground.	___	___	___
Gunner	. Set superelevation on the ballistic computer to ZERO.	___	___	___
Gunner	. Center right telescope of binocular M17A1 over firing pin hole.	___	___	___
Loader	. Place black thread over witness lines.	___	___	___
Loader	. Secure thread on muzzle end of main gun.	___	___	___
Loader	. Remove firing mechanism from breechblock.	___	___	___
Loader	. Check alinement of main gun by sighting through firing pin hole with M17A1 binoculars to see if cross threads lay on aiming point.	___	___	___
Loader	. Report gun out of alinement and assist Gunner to aline it.	___	___	___
Gunner	. Aline axis of 105mm gun bore on right angle of aiming point by operating manual traverse and elevating handles according to Loader's instructions.	___	___	___
Tank Commander	. Range to the boresight target.	___	___	___
Tank Commander	. Set the known tank-to-boresight target range on the range scale of the rangefinder.	___	___	___
Tank Commander	. Place the computer switch on the rangefinder in the OFF position.	___	___	___

PREPARE GUNNER'S TELESCOPE FOR OPERATION [GUNNER]

	Yes	No	NA
. Inspect eyepiece hanger and screws for presence and tightness.	___	___	___
. Inspect the hanger assembly and quick disconnect pin for presence, proper fit, and swivel movement.	___	___	___
. Inspect the holder assembly to ensure that the pin on the telescope and the slot on the holder assembly are seated.	___	___	___
. Adjust headrest by loosening adjusting nut and sliding headrest to desired position and tightening nut.	___	___	___
. Clean lenses.	___	___	___
. Focus eyepiece by rotating diopter to the maximum plus reading and then rotating the diopter back until the view through the eyepiece appears with the maximum sharpness.	___	___	___
. Set reticle illumination by rotating the rheostat knob on instrument light M50.	___	___	___
. Remove filters from filter box.	___	___	___
. Clean if required, and inspect for cracks.	___	___	___
. If conditions warrant use of filters, select proper filter.	___	___	___
. Attach filter to telescope eyepiece.	___	___	___
. View through eyepiece and move reticle selector to each position checking to see that both reticles are visible.	___	___	___

PREPARE GUNNER'S PERISCOPE FOR OPERATION [GUNNER]

	Yes	No	NA
. Inspect the M118 mount for general condition.	___	___	___
. Report any damage to the vehicle commander.	___	___	___
. Adjust the day light and IR headrest for proper fit.	___	___	___
. Open ballistic shield.	___	___	___
. Adjust diopter on the daylight sight by rotating the diopter to the maximum-plus reading and then back until the image seen through the eyepiece appears with the maximum sharpness.	___	___	___
. Set the reticle illumination by rotating the light source control knob until reticle appears with desired brightness.	___	___	___

PREPARE RANGEFINDER FOR OPERATION [TANK COMMANDER]

	Yes	No	NA
. Adjust headrest to fit the contour of the head.	___	___	___
. Rotate occluder knob to the R position.	___	___	___
. Rotate the diopter scale to the maximum plus reading.	___	___	___
. Rotate the diopter scale until the view through the eyepiece appears with the maximum sharpness.	___	___	___
. If necessary move the filter switch to the left to place the filters into the optical system.	___	___	___
. Rotate the range scale rheostat to determine if range scale lamp is illuminated.	___	___	___
. Set rheostat until desired brightness has been obtained.	___	___	___
. Rotate the occluder to the L position.	___	___	___
. Move the reticle switch to the aux-gunsight position.	___	___	___
. Sight through the eyepiece and set red illuminated reticle for brightness by rotating reticle rheostat.	___	___	___
. Rotate occluder knob to the center position and move reticle switch to the coincidence position.	___	___	___
. Sight through the eyepiece and set coincidence reticle brightness by rotating the coincidence reticle rheostat.	___	___	___
. Move reticle switch to the OFF position.	___	___	___
. Rotate the occluder knob to the R position.	___	___	___
. Set the known tank-to-target range on the range scale by rotating the range knob.	___	___	___
. Rotate the occluder knob to the center position.	___	___	___
. Sight through eyepiece and rotate the horizontal adjustment knob until the ghost image is positioned to the left of the actual image.	___	___	___
. Rotate the vertical adjustment knob to bring the ghost image into vertical alinement with the actual image.	___	___	___
. Rotate the horizontal adjustment knob to bring the ghost image into alinement with the actual image from the left to the right -- stop the instant coincidence has been obtained.	___	___	___
. Check target image coincidence by ranging on a known distance target.	___	___	___

PREPARE RANGEFINDER FOR OPERATION [TANK COMMANDER] (Continued)

	Yes	No	NA
. Move reticle switch to coincidence position.	___	___	___
. Loosen the wing nut and swing the red ICS knob cover aside.	___	___	___
. Rotate the ICS knob until vertical lines of the upper right half and lower left portions of the coincidence reticle are alined.	___	___	___
. Loosen the wing nut and swing the red halving knob cover aside.	___	___	___
. Rotate halving knob until horizontal lines of the upper right half and the lower left portions of the coincidence reticle are alined to form a cross.	___	___	___
. Swing the ICS and halving knob covers into place and secure with wing nuts.			
. Move reticle switch to the OFF position.	___	___	___

PREPARE AZIMUTH INDICATOR FOR OPERATION [GUNNER]

	Yes	No	NA
. Rotate rheostat knob until desired brightness is obtained.	___	___	___
. Place the aiming cross of the periscope on the reference point.	___	___	___
. Perform accuracy test by traversing turret 360 degrees to return to original reference point. (Do not go beyond reference point)	___	___	___
. Set the micrometer and azimuth pointers on zero.	___	___	___
. Perform slippage test by traversing the turret rapidly in power and stop suddenly.	___	___	___
. Repeat this operation two or more times in same direction.	___	___	___
. Manually traverse turret in opposite direction to return to original reference point.	___	___	___
. Insure that both the micrometer and azimuth pointers are on zero.	___	___	___

OPERATE ELEVATION QUADRANT [GUNNER]

	Yes	No	NA
. Place aiming point on the center of the target and establish a line of sight.	___	___	___
. Measure the position of the gun tube by rotating the micrometer knob until the bubble is centered in the level vial.	___	___	___
. Read elevation from the elevation and micrometer scales.	___	___	___

INDEX AMMUNITION INTO COMPUTER AND PERFORM COMPUTER TEST [GUNNER]

	Yes	No	NA
. Rotated ammunition selector handle 30 degrees clockwise, pushed handle in or pulled handle out to select ammunition to be fired as indicated on the ammunition indicator.	___	___	___
(Computer check)			
. With range correction knob at zero, rotated range knob on rangefinder and determined whether inner (range) pointer indicated same range on computer range dial as was indexed on range scale of rangefinder.	___	___	___
. Indexed ranges of 1,000, 1,200, or 2,000 meters on range scale of rangefinder.	___	___	___
. Indexed a type of ammunition into the computer.	___	___	___
. Turned the computer ON and determined whether superelevation actuator shaft rotated.	___	___	___
. Determined whether outer (superelevation) pointer moved to match inner (range) pointer.	___	___	___
. Determined whether correct superelevation for range and ammunition selected was indicated on the superelevation mil counter (used firing tables).	___	___	___

BORESIGHT GUNNER'S TELESCOPE AND APPLY ESTABLISHED ZERO
[GUNNER/LOADER]

	Yes	No	NA
Gunner . Move reticle selector switch until reticle corresponding to type of ammunition that will be used to zero can be seen through the eyepiece.	___	___	___
Gunner . Unlock telescope mount elevation and deflection boresight knobs.	___	___	___
Gunner . Rotate the boresight knobs until the boresight aiming cross of the reticle is on the same aiming point as the muzzle cross threads.	___	___	___
Gunner . Move elevation and deflection knob locking levers to the lock position.	___	___	___
Gunner . Rotate slip scales on the elevation and deflection knobs to read 3 and 3.	___	___	___
Gunner . Tell Loader to confirm that the muzzle cross threads are on the aiming point.	___	___	___
Loader . Check the lay of the main gun to assure it is on the aiming point by sighting through firing pin hole using the M17A1 binoculars.	___	___	___

BORESIGHT DAYLIGHT SIGHT OF GUNNER'S PERISCOPE AND APPLY ESTABLISHED ZERO [GUNNER/LOADER]

	Yes	No	NA
Gunner . Sight through the eyepiece, disengage the elevation and deflection boresight knobs, and rotate the knobs until the aiming cross is on the same aiming point as the muzzle cross threads.	___	___	___
Gunner . Rotate slip scale on the elevation and deflection boresight knobs to read 4 and 4.	___	___	___
Gunner . Confirm that the daylight sight reticle is on the aiming point.	___	___	___
Gunner . Tell Loader to confirm that the muzzle cross threads are on the aiming point.	___	___	___
Loader . Check the lay of the main gun to identify the aiming point by sighting through the firing pin hole with the M17A1 binoculars.	___	___	___

BORESIGHT IR SIGHT OF GUNNER'S PERISCOPE DURING DAYLIGHT AND APPLY ESTABLISHED ZERO [GUNNER/LOADER]

	Yes	No	NA
Gunner . Open the ballistic shield.	___	___	___
Gunner . Place opaque material over the periscope head assembly with a 3/4 inch hole in line with the IR body.	___	___	___
Gunner . Place the IR switch in the 1.5 volt position.	___	___	___
Gunner . View through the IR eyepiece and rotate the IR diopter to the maximum plus reading then back until the grain on the converter tube surface as seen through the eyepiece appears clear and sharp.	___	___	___
Gunner . Rotate the light source control until the reticle illumination has the desired brightness.	___	___	___
Gunner . Sight through the eyepiece and rotate focusing ring until the target appears with the maximum sharpness.	___	___	___
Gunner . Disengage and rotate the elevation and deflection boresight knobs until the aiming cross of the reticle is alined on the same aiming point as the muzzle cross threads.	___	___	___
Gunner . Rotate slip scale on the elevation and deflection boresight knobs to read 4 and 4.	___	___	___
Gunner . Confirm that aiming cross on the reticle of the daylight scope is on the aiming point.	___	___	___
Gunner . Tell Loader to confirm that the muzzle cross threads are on the aiming point.	___	___	___
Loader . Check the lay of the main gun to identify the aiming point by sighting through the firing pin hole using the M17A1 binoculars.	___	___	___

BORESIGHT RANGEFINDER WITH THE MAIN GUN BORE AXIS ALINED ON AN AIMING POINT AT 1200 METERS [TANK COMMANDER/LOADER]

		Yes	No	NA
Tank Commander	. Check coincidence reticle for alinement and if necessary, aline reticle using horizontal and vertical adjustment.	___	___	___
Tank Commander	. Place the occluder knob on the rangefinder in the R position.	___	___	___
Tank Commander	. Move the locking levers of the main elevation and deflection boresight knobs to the unlocked position.	___	___	___
Tank Commander	. Sight through rangefinder eyepiece and aline the blacketched cross on the sight reticle with the same aiming point as the main gun bore axis.	___	___	___
Tank Commander	. Move the boresight knob locking levers to the lock position.	___	___	___
Tank Commander	. Rotate slip scale to read 2 on elevation boresight knob and 3 on deflection boresight knob.	___	___	___
Tank Commander	. Place the occluder knob in the L position.	___	___	___
Tank Commander	. Place the reticle switch on the rangefinder in the aux-gunsight position.	___	___	___
Tank Commander	. Unlock auxiliary elevation and deflection knobs.	___	___	___
Tank Commander	. Rotate the knobs to aline the red illuminated cross on the same aiming point as the main gun bore axis.	___	___	___
Tank Commander	. Lock aux-gunsight elevation and deflection knobs.	___	___	___
Tank Commander	. Rotate slip scale on auxiliary elevation boresight knob to read 2 and the auxiliary deflection boresight knob to read 3.	___	___	___
Tank Commander	. Check main gun bore axis, main gun laying reticle of the rangefinder, and the aux-gunsight to assure that each is alined on the same aiming point.	___	___	___

BORESIGHT RANGEFINDER WITH THE MAIN GUN BORE AXIS ALINED ON AN AIMING POINT AT 1200 METERS [TANK COMMANDER/LOADER] (Continued)

	Yes	No	NA
Loader . Check the lay of the main gun to identify the aiming point by sighting through the firing pin hole using the M17A1 binoculars.	___	___	___

DETERMINE RANGE TO TARGET WITH RANGEFINDER [TANK COMMANDER]

	Yes	No	NA
. Place OCCLUDER knob in center position.	___	___	___
. Concentrate on a vertical part or near vertical part of the target and rotate the range knob until the two target images merge.	___	___	___
. Read range to target on range scale.	___	___	___

BORESIGHT M219 MACHINEGUN [LOADER/GUNNER]

	Yes	No	NA
Loader . Remove the solenoid electrical lead from the machinegun backplate assembly by grasping the solenoid plug and apply a downward force.	___	___	___
Loader . Pull the right disconnector ring rearward with sufficient force to disengage the disconnector pin from the disconnector hole.	___	___	___
Loader . Rotate the receiver downward and pull rearward until disengaged from mounting block.	___	___	___
Loader . Loosen support setscrews located in the gun mount cover shield collar approximately 1 1/2 turns.	___	___	___
Loader . Select the target employed to boresight the main gun with a clearly defined right angle at a distance of 1200 meters.	___	___	___
Loader . Aline the machinegun bore vertically on target while viewing the aiming point through the right binocular M17A1 so as to adjust the machinegun elevation alinement with the bore of the main gun by loosening or tightening the adjusting screws.	___	___	___
Loader . Physically inspect both vertical screws to insure they are tightened securely.	___	___	___
Loader . Tighten lock and jam nuts.	___	___	___
Loader . Tighten mounting screws.	___	___	___
Loader . Loosen bracket assembly mounting screws.	___	___	___
Loader . Loosen lock and jam nuts on both front and rear horizontal adjusting set screws.	___	___	___
Loader . Aline machinegun bore horizontally on target by loosening or tightening front and rear horizontal adjusting screws while viewing the aiming point through the right binocular M17A1 thereby adjusting machinegun azimuth with the bore of the 105mm gun.	___	___	___
Loader . Inspect visually and mechanically, both horizontal adjusting screws and insure they are tightened securely.	___	___	___
Gunner . Rotate, either to the left or right, the rheostat knob on the infinity sight M44C for periscope M31 or the rheostat knob of the light source control for periscope M30 in order to adjust brightness of reticle.	___	___	___

BORESIGHT M219 MACHINEGUN [LOADER/GUNNER] (Continued)

	Yes	No	NA
Loader . Adjust, by rotating support set screws in collar on gun mount cover until they contact the flash suppressor body, then back off setscrews 1/4 to 1/2 turn.	___	___	___
Gunner . Rotate both the elevation and deflection boresight knobs on the infinity sight so as to aline the center of reticle on aiming point of target.	___	___	___
Loader . Replace receiver assembly by positioning left disconnector pin through left disconnector hole in mounting block.	___	___	___
Loader . Pull rearward on right disconnector ring to allow the disconnector pin to clear the mounting block and rotate the receiver counter-clockwise until the disconnector pin is alined with the disconnector hole.	___	___	___
Loader . Release disconnector ring allowing the disconnector pin to seat itself in the disconnector hole of the mounting block.	___	___	___
Loader . Grasp receiver group and apply rotational force to insure that the disconnector pins are securely seated.	___	___	___
Loader . Connect the solenoid electrical lead to the back plate assembly and insure that it is seated.	___	___	___

BORESIGHT SEARCHLIGHT USING PRIMARY METHOD [TANK COMMANDER/GUNNER]

		Yes	No	NA
Tank Commander	. Select a target as near 1200 meters as possible.	___	___	___
Tank Commander	. Tell Driver to idle tank engine at 1000-1200 RPM.	___	___	___
Tank Commander	. Turn searchlight main power switch to the ON position and turn searchlight control to VIS FOCUS mode.	___	___	___
Gunner	. Remove all superelevation from the fire control system using the computer's superelevation handcrank.	___	___	___
Gunner	. Lay aiming cross of primary sight on the center of the boresight panel or target chosen.	___	___	___
Gunner	. Center the bubble on the elevation quadrant using the micrometer knob.	___	___	___
Gunner	. Apply plus 5 mils on elevation quadrant using the micrometer knob.	___	___	___
Gunner	. Manually elevate the gun until the bubble is centered.	___	___	___

BORESIGHT SEARCHLIGHT USING THE ALTERNATE METHOD (XENON)
[TANK COMMANDER/GUNNER]

		Yes	No	NA
Tank Commander	. Direct Driver to position tank so the searchlight is approximately 10 meters from a wall.	___	___	___
Tank Commander	. Draw a cross on the wall approximately 7 feet from the ground.	___	___	___
Tank Commander	. Draw a second cross 16 1/2 inches directly above the first cross and vertically in line with the first cross.	___	___	___
Tank Commander	. Tell Driver to insure that the tank engine is run at a fast idle speed.	___	___	___
Tank Commander	. Turn searchlight main power switch to ON position and turn searchlight control to VIS FOCUS mode.	___	___	___
Tank Commander	. Adjust horizontal and vertical adjustment screws until the searchlight beam is centered on the upper cross.	___	___	___
Tank Commander	. Tell Loader to draw reference mark at the bottom edge of the searchlight beam.	___	___	___
Tank Commander	. Adjust vertical and horizontal adjustment screws until the bottom of the searchlight beam is above and just touching the reference mark.	___	___	___
Gunner	. Remove superelevation from fire control system using computer's handcrank.	___	___	___
Gunner	. Boresight main gun on lower cross.	___	___	___
Gunner	. Center the bubble on the elevation quadrant using the micrometer knob.	___	___	___
Gunner	. Apply plus 5 mils to elevation quadrant using the micrometer knob.	___	___	___
Gunner	. Manually elevate the gun until the bubble is centered.	___	___	___

BORESIGHT M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Disconnect solenoid lead connector.	___	___	___
. Remove backplate group and open cover.	___	___	___
. Slide sear assembly rearward from receiver.	___	___	___
. Remove bolt.	___	___	___
. Sight through machinegun barrel and aline axis of gun bore on defined target approximately 500 meters in range.	___	___	___
. Lock azimuth lock.	___	___	___
. Adjust deflection without moving the gun or cupola.	___	___	___
. Adjust elevation.	___	___	___
. Install bolt.	___	___	___
. Install sear assembly into receiver assembly.	___	___	___
. Install bolt buffer group.	___	___	___
. Install backplate group.	___	___	___
. Connect solenoid lead connector.	___	___	___

LOAD M219 MACHINEGUN [LOADER]

	Yes	No	NA
. Push forward on the rear of the left cover latch rod assembly and raise the cover.	___	___	___
. Raise the feed tray.	___	___	___
. Place the machinegun safety in the FIRE position.	___	___	___
. Charge (cock) the machinegun by pulling the charger handle to the rear.	___	___	___
. Inspect the chamber for obstructions by looking and feeling in the chamber.	___	___	___
. Place safety in SAFE.	___	___	___
. Lower feed tray.	___	___	___
. Feed ammunition belt through chute of ammunition box.	___	___	___
. Place first round of ammunition belt in feed tray slot with the open side of ammunition link loops facing down.	___	___	___
. Close machinegun cover assuring that lock rod is engaged.	___	___	___

ZERO M219 MACHINEGUN [GUNNER/TANK COMMANDER/LOADER]

		Yes	No	NA
Gunner	. Select a target with a clearly defined aiming point at a known range as near 800 meters as possible.	___	___	___
Tank Commander	. Rotate the range knob of the rangefinder to range the target.	___	___	___
Gunner	. Index the lowest velocity tank main gun ammunition in the ballistic computer.	___	___	___
Gunner	. Sight through the unity power window of the Gunner's periscope (M31) and lay the target in the center of the aiming circle by operating the manual elevation and traversing handles.	___	___	___
Loader	. Load weapon.	___	___	___
Loader	. Announce UP.	___	___	___
Gunner	. Place the electrical machinegun switch on the Gunner's panel in the ON position.	___	___	___
Gunner	. Depress the electrical firing trigger and fire a 20-25 round burst.	___	___	___
Gunner	. Observe the strike of the rounds in relation to the target.	___	___	___
Gunner	. Rotate the infinity sight boresight knobs to move the sight reticle so that the strike area is in the center of the field of view.	___	___	___
Gunner	. Fire an additional 20-25 round burst to check the accuracy of adjustment.	___	___	___
Gunner	. Rotate the infinity sight boresight knobs, if necessary, to readjust the field of view in relation to the strike of the rounds.	___	___	___

CLEAR AND UNLOAD M219 MACHINEGUN [LOADER]

	Yes	No	NA
A. CLEAR M219 MACHINEGUN			
. Charge weapon to lock moving parts to the rear.	___	___	___
. Instruct Gunner to turn electrical machinegun switch OFF.	___	___	___
. Place machinegun safety in SAFE.	___	___	___
. Push left cover latch rod forward and raise cover.	___	___	___
. Remove ammunition from feed tray.	___	___	___
. Lift feed tray.	___	___	___
. Look and feel in receiver and chamber to insure they are clear of ammunition.	___	___	___
. Place machinegun safety in FIRE.	___	___	___
. Charge (cock) machinegun by pulling the charge handle to the rear.	___	___	___
. Allow barrel extension to close slowly by maintaining tension on the charging handle and depressing manual firing trigger.	___	___	___
. Place safety in SAFE.	___	___	___
. Close the cover assembly.	___	___	___
B. UNLOAD M219 MACHINEGUN			
. Direct Gunner to turn machinegun switch OFF.	___	___	___
. Place safety in SAFE.	___	___	___
. Open cover assembly.	___	___	___
. Remove ammunition belt from the machinegun.	___	___	___

LOAD M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Unlatched and raised cover assembly.	___	___	___
. Visually checked and felt chamber for a round.	___	___	___
. Pulled trigger extension handle, depressing trigger, to allow bolt assembly to close slowly.	___	___	___
. Placed belts lead round, with the open side of the links down, inside and against the belt retaining pawls, with the bolt in the forward position.	___	___	___
. Closed cover assembly.	___	___	___
. Charged machinegun by pulling charger assembly fully rearward.	___	___	___
. Placed safety in safe (S) position.	___	___	___

NOTE: Safety must <u>never</u> be on safe (S) position when bolt assembly is to be retracted to its rearward position.

ZERO M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Selected a target with a clearly defined aiming point at a range of 500 meters.			
. Laid the 500 meter aiming point of the Tank Commander's weapon sight on the aiming point of the zeroing target with the elevating and traversing controls.	___	___	___
. Fired a 10-20 round burst.	___	___	___
. Moved the 500-meter reticle to the center of the strike area without disturbing the lay of the gun.	___	___	___
. Fired another 10-20 round burst to verify the zero.	___	___	___

CLEAR AND UNLOAD M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Placed cupola firing safety switch in OFF position.	___	___	___
. Held cupola electrical power control switch in OFF position momentarily.	___	___	___
. Assured safety was in SAFE (S) position.	___	___	___
. Unlatched and opened cover assembly.	___	___	___
. If bolt assembly was in forward position, placed safety in FIRE (F) position and pulled charger handle until bolt assembly was fully rearward.	___	___	___
. Kept tension on charger handle, pulled trigger extension handle to depress trigger and allowed bolt assembly to close slowly.	___	___	___
. Placed safety in SAFE (S) position.	___	___	___

CHANGE M219 MACHINEGUN BARREL [LOADER]

	Yes	No	NA
. Opened cover assembly and removed belted ammunition.	___	___	___
. Charged weapon to sear position and placed safety in SAFE.	___	___	___
. Removed live ammunition or spent cartridges from weapon chamber and links from immediate area.	___	___	___
. Ensured weapon is clear by looking into and feeling receiver and chamber.	___	___	___
. Pulled disconnector ring to the rear to allow receiver assembly to rotate downward.	___	___	___
. Removed barrel assembly from jacket assembly.	___	___	___
. Installed new barrel assembly in jacket assembly.	___	___	___
. Rotated receiver assembly upward and allowed disconnector to engage into jacket assembly mounting block.	___	___	___
. Placed safety in FIRE and hand functioned weapon one cycle.	___	___	___
. Loaded weapon and attempted to fire.	___	___	___

(WARNING: Use asbestos gloves when removing a hot barrel.)

LOAD MAIN GUN [LOADER]

	Yes	No	NA
. Open the breech.	___	___	___
. Assure chamber is empty.	___	___	___
. Return operating handle to latched position.	___	___	___
. Select round of ammunition designated in firing command.	___	___	___
. Close and join fingers of right hand and push round into chamber vigorously with heel of hand while rotating body to the left and sliding hand upward off round to clear breech.	___	___	___

ZERO MAIN GUN [TANK COMMANDER/GUNNER/LOADER]

		Yes	No	NA
Tank Commander	. Turn computer switch ON.	___	___	___
Gunner	. Index ammunition element into ballistic computer.	___	___	___
Tank Commander	. Index range into rangefinder.	___	___	___
Loader	. Load main gun.	___	___	___
Loader	. Announce UP.	___	___	___
Gunner	. Lay sight reticle on center of mass of target by operating the manual elevation and traversing handles.	___	___	___
Gunner/ Loader	. Fire a three round shot group.	___	___	___
Gunner	. Unlock boresight knobs and move sight reticle to center of shot group, without disturbing the lay of the gun.	___	___	___
Gunner	. Re-lay main gun back to center of mass by operating the manual elevation and traversing handles.	___	___	___
Gunner/ Loader	. Fire a check round.	___	___	___
Gunner	. Re-lay main gun back to center of mass by operating the manual elevation and traversing handles.	___	___	___
Gunner	. Record elevation and deflection readings on all sights.	___	___	___

APPENDIX B

MODULE II

TACTICAL OPERATIONS

MODULE II: TACTICAL OPERATIONS

OBJECTIVE: To determine whether the tank crew can move, shoot and communicate in a tactical combat environment.

PROCEDURE: The Tank Commander should insure that his tank crosses the LD at the appropriate time. The crew will cross the line of departure and seize objective ALFA as shown on the sketch map. During the operations phase, they will encounter enemy personnel, wheeled vehicles and tanks. All targets of opportunity should be engaged.

CONDITIONS: 1. The module will be administered during daylight and darkness. The daylight phase will be along a tactical route capable of supporting tank traffic. The night phase will be from a turret defilade defensive position.

2. The daylight route should not exceed 5 KM nor have more than four lateral routes or key terrain features.

RATER ACTIVITIES: The rater should respond to all tested vehicle radio traffic and initiate or respond to radio traffic to insure the test situations, boundaries and time limits are being followed. The rater should observe each of the operations on the attached checklist. He should not question crew members, indicate the ratings that are being given, or prompt crew members in any way.

RATER EQUIPMENT:

Rating sheets, Module II, attached

Map 1:50,000

Binoculars

Protective mask

CEOI Extract

PERFORMANCE ASSESSMENT:

1. The daylight phase should be completed within 1/2 hour of crossing the LD. The night phase should be completed within 1/2 hour of occupying a night firing position.

2. When operating the tank, the Driver must:

- . Operate with minimum guidance from the Tank Commander.
- . Select course of movement by viewing and analyzing terrain prior to movement.
- . Position tank, when moving and at the halt, to take advantage of terrain and vegetation.
- . Evaluate soil condition by color and vegetation to avoid impassable ground.
- . Maintain steady speed during movement.
- . Traverse open areas rapidly.
- . Traverse areas slowly when visibility is restricted.

3. Radio traffic must be kept to a minimum. Reports not required by SOP or immediately by the situation are not submitted by radio.

- . Reports required are submitted by:
  - SOP format or,
  - Who
  - What
  - Where
  - When
  - Activity

4. Radio security must be maintained:

. Friendly information not sent in the clear.
. Correct radio telephone procedure used.
. Codes and clear text not interchanged.

ATTACHMENTS:

Schematic diagram, Module II

Rating sheets, Module II

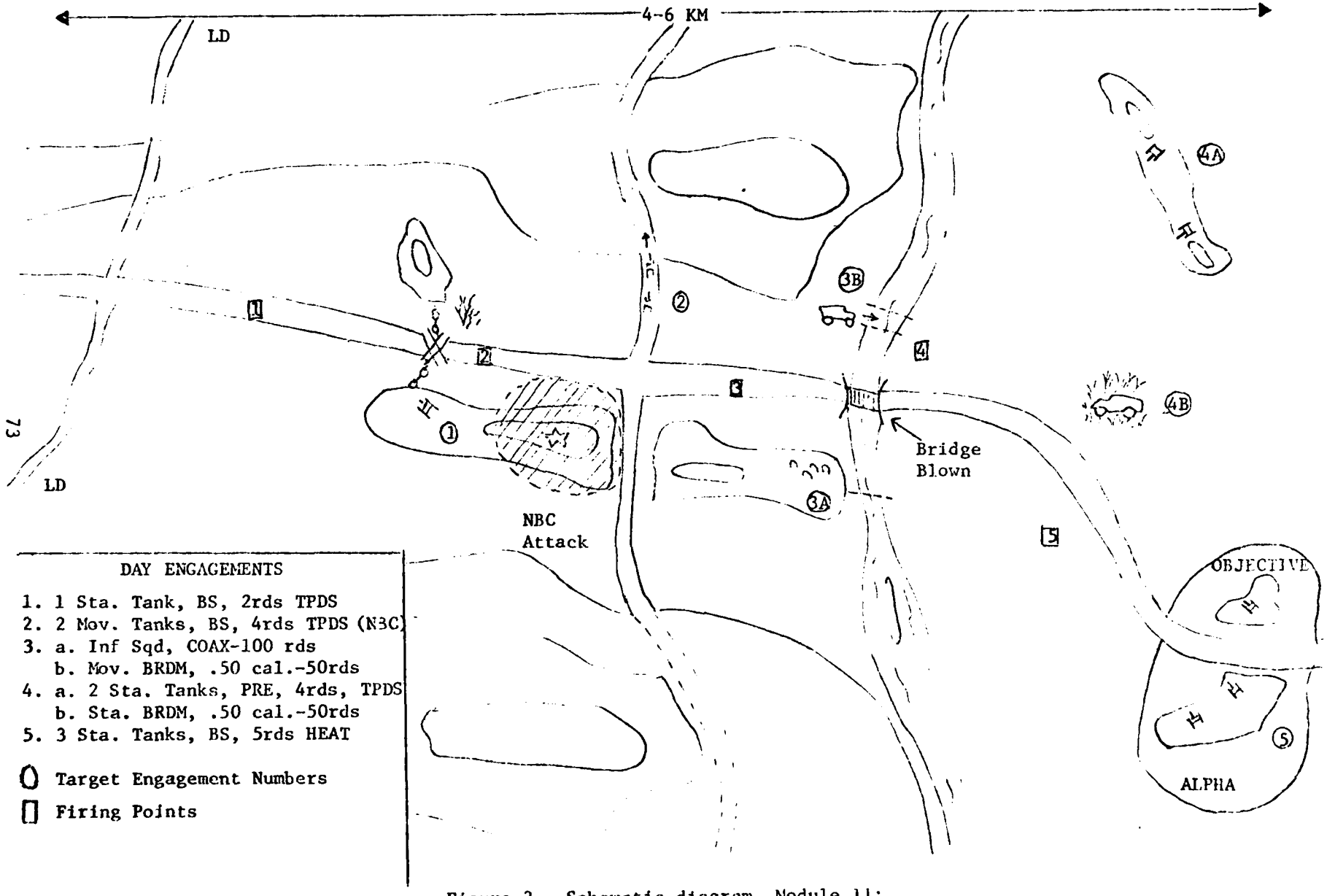


Figure 3. Schematic diagram, Module 11: Tactical Operations (Day Firing Course).

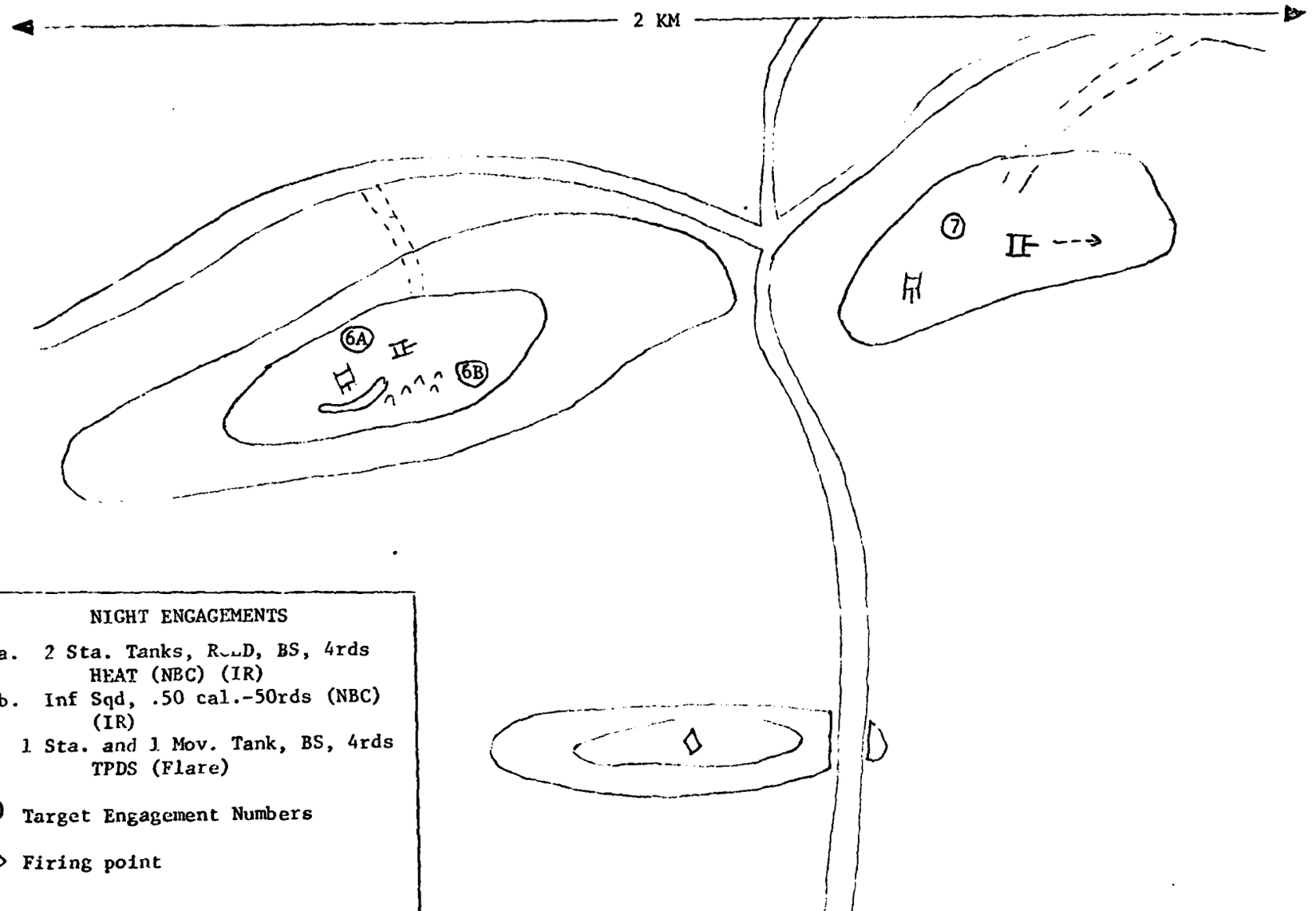
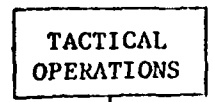


Figure 4. Schematic diagram, Module II: Tactical Operations (Night Firing Course).



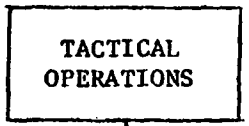
DRIVER

1. Drive tank over varied terrain with hatches open/closed.
2. Acquire targets.
3. Drive in response to fire commands
4. Main gun engagement - moving to a halt - stationary point target.
5. Main gun engagement - moving to a halt - multiple moving point targets.
6. Coax/Caliber .50 simultaneous engagement - moving to a halt - stationary area and moving point targets.
7. Main gun/Caliber .50 simultaneous engagement - moving to a halt - multiple stationary point targets.
8. Main gun engagement - moving to a halt - multiple stationary point targets.
9. Install M24 (IR) periscope.

LOADER

1. Acquire targets.
2. Main gun engagement - moving to a halt - stationary point target.
3. Main gun engagement - moving to a halt - multiple point targets.
4. Coax/Caliber .50 simultaneous engagement - moving to a halt - stationary area and moving point targets.
5. Main gun/Caliber .50 simultaneous engagement - moving to a halt - multiple stationary point targets.
6. Main gun engagement - moving to a halt - multiple stationary point targets.
7. Main gun/Caliber .50 simultaneous engagement - at the halt - multiple stationary point and area targets.
8. Main gun engagement - at the halt - moving and stationary point targets.

Figure 5. Tasks performed by each crew member during Module II: Tactical Operations



DRIVER

10. Place M24(IR) periscope into operation.
11. Main gun/Caliber .50 simultaneous engagement - at the halt - multiple stationary point and area targets.
12. Main gun engagement - at the halt - moving and stationary point targets.
13. Drive to defilade firing position upon enemy contact.
14. Perform evasive manuevers upon enemy contact.
15. Sense rounds.
16. Perform during-operations maintenance checks and services on steering, accelerator shift, and brake controls.
17. Perform during-operations checks on instruments, gages, and warning lights.

LOADER

9. Apply immediate action to reduce stoppage of M219 machinegun.
10. Perform misfire procedures for the main gun
11. Remove a misfired main gun round.
12. Determine corrective action required by replenisher tape.

Figure 5. (Continued) Tasks performed by each crew member during Module II: Tactical Operations

TACTICAL OPERATIONS

GUNNER

1. Acquire targets.
2. Main gun engagement - moving to a halt - stationary point target.
3. Main gun engagement - moving to a halt - multiple moving point targets.
4. Coax/Caliber .50 simultaneous engagement - moving to a halt - stationary area and moving point targets.
5. Main gun/Caliber .50 simultaneous engagement - moving to a halt - multiple stationary point targets.
6. Main gun engagement - moving to a halt - multiple stationary point targets.
7. Main gun/Caliber .50 simultaneous engagement - at the halt - multiple stationary point and area targets.
8. Main gun engagement - at the halt - moving and stationary point targets.
9. Perform misfire procedures for main gun.

TANK COMMANDER

1. Acquire targets.
2. Designate crew sectors of responsibility for target acquisition.
3. Determine if target is within battlesight range.
4. Issue initial fire command.
5. Main gun engagement - moving to a halt - stationary point target.
6. Main gun engagement - moving to a halt - multiple moving point targets.
7. Coax/Caliber .50 simultaneous engagement - moving to a halt - stationary area and point targets.
8. Main gun/Caliber .50 simultaneous engagement - moving to a halt - multiple stationary point targets.
9. Main gun engagement - moving to a halt - multiple stationary point targets.
10. Main gun/Caliber .50 simultaneous engagement - at a halt - multiple stationary point and area targets.

Figure 5. (Continued) Tasks performed by each crew member during Module II: Tactical Operations

TACTICAL OPERATIONS

GUNNER	TANK COMMANDER
10. Remove misfired main gun round.	11. Main gun engagement - at the halt - moving and stationary point targets.
11. Sense rounds.	12. Perform evasive maneuvers upon enemy contact.
12. Apply burst on target (BOT) adjustment.	13. Apply immediate action to reduce stoppage of M85 machinegun.
13. Apply target form (TF) adjustment.	14. Sense rounds.
14. Apply standard adjustment.	15. Issue subsequent fire commands.

Figure 5. (Continued) Tasks performed by each crew member during Module II: Tactical Operations

DRIVE THE TANK OVER VARIED TERRAIN WITH DRIVER HATCH IN THE OPEN/CLOSE POSITION [DRIVER]

	Yes	No	NA
OPERATE TANK IN NEUTRAL STEER			
Given the special command to "PIVOT TANK LEFT IN NEUTRAL STEER":			
. Moved the transmission shift lever to N.	___	___	___
. Pulled the left side of the steering wheel down to the maximum for a left pivot.	___	___	___
. Depressed the accelerator slowly while holding the steering wheel in the desired direction.	___	___	___
DRIVE OVER VARIED TERRAIN			
Cross a Vertical Obstacle.			
. Warned crew members of the obstacle.	___	___	___
. Pushed transmission shift lever up in L when speed reached 9 MPH or less.	___	___	___
. Met the obstacle with both tracks simultaneously.			
. Applied sufficient acceleration to climb the obstacle.	___	___	___
. Continued to accelerate until the tank started to counter balance.	___	___	___
. Decelerated as tank counter balanced forward.			
. Did not attempt to steer while climbing the obstacle.	___	___	___
Cross a Ditch.			
. Warned the crew of the approaching ditch.	___	___	___
. Pushed transmission shift lever up to L when the speed reached 9 MPH or less.	___	___	___
. Decelerated as the tank counter balanced forward into the ditch.	___	___	___
. Eased tank to the bottom by braking and releasing the brake.	___	___	___
. Met bottom of ditch with both tracks simultaneously.	___	___	___
. Accelerated tank as tracks struck bottom.	___	___	___
. Decelerated tank as it pitched over the top.	___	___	___

DRIVE THE TANK OVER VARIED TERRAIN WITH DRIVER HATCH IN THE OPEN/CLOSE POSITION [DRIVER] (Continued)

	Yes	No	NA
DRIVE OVER VARIED TERRAIN (Continued)			
Ascend a Steep Grade.			
. Pushed transmission shift lever up to L position when the speed reached 9 MPH or less.	___	___	___
. Accelerated to climb the incline.	___	___	___
. On steep grades (50%-60%) ascended backwards using Reverse.	___	___	___
Decend a Steep Grade.			
. Pushed transmission shift lever up to L when speed reached 9 MPH or less.	___	___	___
. Used brakes to maintain engine speed at less than 2600 RPM.	___	___	___
. On steep grades (50%-60%) stopped the tank, pulled the transmission shift lever to Reverse and allowed the tank to move forward.	___	___	___
. Accelerated to slow the tank's descent, maintaining sufficient engine speed to keep the engine above stall.	___	___	___
. Pulled steering wheel down counterclockwise to turn right; pulled the steering wheel down clockwise to turn left.	___	___	___
. Stopped tank if engine stalled.	___	___	___
. Stopped and restarted the engine, if engine started to run backwards.	___	___	___
. Pushed transmission shift lever up to neutral, maintained brake pressure and allowed the tank to slide down the incline without steering, if the engine started to run backwards and brakes would not stop the tank.	___	___	___

ACQUIRE TARGETS [DRIVER/LOADER/GUNNER/TANK COMMANDER]

	Yes	No	NA
. Observe assigned sector for potential enemy targets.			
- Search sector for ground targets by scanning from left to right beginning near own location and working out to the horizon.	___	___	___
. Describe target.	___	___	___
. Estimate range to target by:			
- mil relation technique	___	___	___
- approximation in 100 meter increments.	___	___	___
. Determine direction to target:			
- in mils	___	___	___
- by the clock method	___	___	___

DESIGNATE CREW SECTORS OF RESPONSIBILITY FOR TARGET ACQUISITION
[TANK COMMANDER]

	Yes	No	NA
. Designated Gunner's sector as: clockwise from 10:00 o'clock to 2:00 o'clock.	___	___	___
. Designated Loader's sector as: clockwise from 9:30 o'clock to 5:30 o'clock.	___	___	___
. Designated Driver's sector as: clockwise from 10:00 o'clock to 2:00 o'clock.	___	___	___
. Designated TC's (own) sector as: clockwise from 9:00 o'clock to 6:30 o'clock.	___	___	___

DETERMINE IF TARGET IS WITHIN BATTLESIGHT RANGE [TANK COMMANDER]

	Yes	No	NA
. Observed target with binocular or naked eye.	___	___	___
. Made battlesight decision within 3 seconds.	___	___	___
. Used battlesight engagement methods for targets within 1600 meters.	___	___	___
. Used precision engagement method for targets beyond 1600 meters.	___	___	___

ISSUE INITIAL FIRE COMMAND [TANK COMMANDER]

	Yes	No	NA
. Announced alert element as GUNNER or CALIBER FIFTY.	___	___	___
. Announced ammunition element as BATTLESIGHT or SABOT or HEAT or COAX.	___	___	___
. Announced target element as TANK or MOVING TANK or ANTITANK or MOVING ANTITANK or TROOPS.	___	___	___
. Announced direction element if unable to lay main gun on target.	___	___	___
. Announced range element if unable to range to target during precision engagements.	___	___	___
. Announced execution element as FIRE.	___	___	___

DRIVE IN RESPONSE TO FIRE COMMANDS [DRIVER]

	Yes	No	NA
a. Drive to a Halt for Coax Point Target Engagement.			
. Maintained steady speed during initial part of Coax, point target element in fire command.	___	___	___
. Maneuvered hull toward target.	___	___	___
. Announced adverse terrain conditions.	___	___	___
. Moved to a hull down firing position.	___	___	___
. Brought tank to a smooth gradual halt.	___	___	___
b. Drive to a Halt for .50 Caliber Point Target Engagement.			
. Maintained steady speed during initial part of .50 caliber, point target element in fire command.	___	___	___
. Maneuvered hull toward target.	___	___	___
. Announced adverse terrain conditions.	___	___	___
. Moved to a hull down firing position.	___	___	___
. Brought tank to a smooth gradual halt.	___	___	___
c. Drive to a Halt for Main Gun Target Engagement.			
. Maintained steady speed during initial part of main gun element in fire command.	___	___	___
. Maneuvered hull toward target.	___	___	___
. Announced adverse terrain conditions.	___	___	___
. Moved to a hull down firing position.	___	___	___
. Brought tank to a smooth gradual halt.	___	___	___

TACTICAL OPERATIONS, FIRING NOTES

1. The firing phase of the Crew Interaction Performance Test (CIPT) tests the tank crew's ability to engage various target arrays indicated in Table VII of FM 17-12. The engagement tables which follow reflect a modified Table VII. (It is recognized that existing range facilities may not permit conducting the firing phase of the CIPT as written. However, each type of engagement should be accomodated to provide tank crews with an opportunity to try out crew skills prior to firing Table VII for record. As a minimum, engagements should include - battlesight, precision, NBC environment, multiple, simultaneous, IR, flare (or whitelight), and RCLD - actions.)

2. Engagement notes.

   a. If the first round is sensed as TARGET, a second round will not be fired.

   b. In the event a target is not hit or engaged during a multiple or simultaneous engagement, the engagement will be rated as unsatisfactory.

   c. Engagement 4A is a precision engagement. All other main gun engagements are battlesight engagements.

   d. Engagements 2 and 6A and 6B are conducted in an NBC environment.

   e. Engagement 6A is a RCLD engagement.

   f. Engagements 6A and 6B are IR engagements with a second tank illuminating the target.

   g. Engagement 7 is a flare engagement. (If flares are not available, white light provided by an illuminating tank is satisfactory.)

   h. Satisfactory ammunition conservation equals seven (7) rounds conserved during seven (7) main gun engagements.

3. Ammunition requirements for the CIPT are:

Engagement	COAX	CAL. .50	SABOT*	HEAT*
		Day Phase		
1	--	--	2	--
2	--	--	4	--
3A	100	--	--	--
3B	--	50	--	--
4A	--	--	4	--
4B	--	50	--	--
5	--	--	--	5
Total rounds day	100	100	10	5
		Night Phase		
6A	--	--	--	4
6B	--	50	--	--
7	--	--	4	--
Total rounds night	--	50	4	4
		Total		
	100	150	14	9

* TELFARE, add 23 rounds caliber .50 and delete 14 rounds SABOT and 9 rounds HEAT.

AD-A082 706 HUMAN RESOURCES RESEARCH ORGANIZATION ALEXANDRIA VA F/G 5/9
TANK CREW (M60A1) PERFORMANCE EXERCISE.(U)
NOV 79 R E O'BRIEN, J H HARRIS, W C OSBORN DAHC19-76-C-0001
UNCLASSIFIED HUMRRO-RP-WD(KY)-79-13 ARI-RP-79-15 NL

2 OF 2
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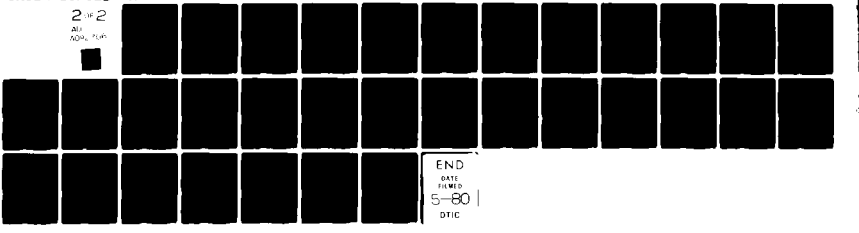
A082 706



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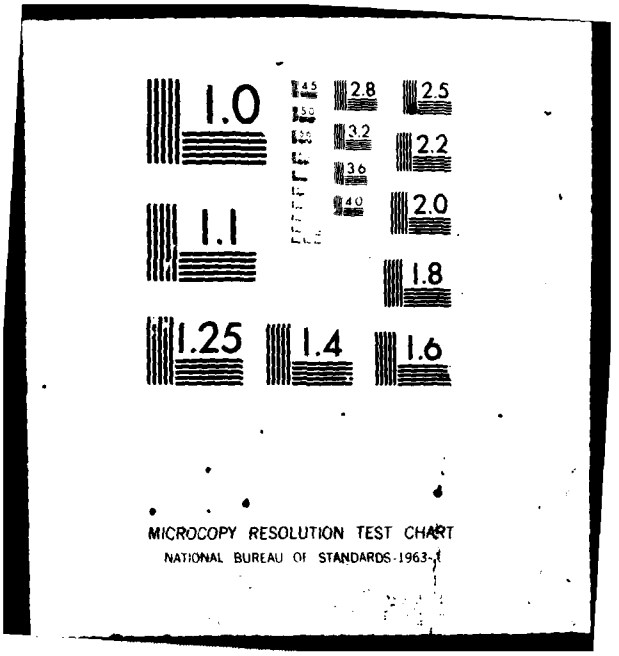
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

MAIN GUN ENGAGEMENT
- STATIONARY POINT TARGET -
(ENGAGEMENT 1)

	TANK COMMANDER	GUNNER	LOADER	DRIVER
1.	Command "GUNNER". Simultaneously lay gun for direction.		Check turret ring for obstructions.	Slow speed of tank.
2.	"BATTLESIGHT"	Turn ON main gun switch. Index SABOT into computer.	Check path of recoil. Place safety switch in FIRE position.	Bring tank to a smooth halt.
3.	"TANK"	Look through sight and find target.	Announce "UP."	Lock brakes and remove hands from steering controls.
4.		Upon seeing target announce "IDENTIFIED."	Prepare to load second round.	Brace.
5.	After Gunner announces "IDENTIFIED," command "FIRE" and sense round.	Place crosshairs at center of base of target, announce "ON THE WAY," and fire.	Brace.	Sense round.
6.	If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load second round.	
7.		Lay aiming point on target.	Announce "UP."	Brace.
8.	Sense round.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
9.	Command "CEASE FIRE" after target hit.	Turn main gun switch OFF.	Place safety switch in SAFE position.	Unlock brakes.
10.	Observe sector with binoculars.	Observe sector.	Observe sector.	Observe sector.

PERFORMANCE MEASURE:

MAIN GUN ENGAGEMENT
- STATIONARY POINT TARGET -
(ENGAGEMENT 1)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT - - -					
700 - 800 MTRS	2 - TELFARE (Sim TPDS)	TIME: 16 sec	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

NOTE: Explain NO ratings for each crewmember.

MAIN GUN ENGAGEMENT
- MULTIPLE MOVING POINT TARGETS -
(ENGAGEMENT 2 NBC)

TANK COMMANDER	GUNNER	LOADER	DRIVER
1. Command "GUNNER." Simultaneously lay gun for direction.		Check turret ring for obstruction.	Slow speed of tank.
2. "BATTLESIGHT"	Turn ON main gun switch. Index SABOT into computer.	Check path of recoil. Place safety switch in FIRE position.	Bring tank to a smooth halt.
3. "TWO MOVING TANKS, RIGHT TANK FIRST."	Look through sight and find target.	Announce "UP."	Lock brakes and remove hands from steering controls.
4.	Upon seeing target announce, "IDENTIFIED."	Prepare to load second round.	Brace.
5. After Gunner announces "IDENTIFIED," command "FIRE" and sense round.	Place crosshair leadline at center of base of target. Announce "ON THE WAY" and fire.	Brace.	Sense round.
6. If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load second round.	
7.	Lay aiming point on target.	Announce "UP."	Brace.
8. Sense round.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
9. Command "TARGET" after target hit and command "LEFT TANK."	Look through sight and find target.	Load third round and announce "UP."	Brace.
10.	Upon seeing target announce "IDENTIFIED."	Prepare to load fourth round.	
11. After Gunner announces "IDENTIFIED," command "FIRE" and sense round.	Place crosshair leadline at center of base of target. Announce "ON THE WAY" and fire.	Brace.	Sense round.
12. If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load fourth round.	
13.	Lay aiming point on target.	Announce "UP."	Brace.
14. Sense round.	Announce "ON THE WAY" & fire.	Brace.	Sense round.
15. Command "CEASE FIRE" after target hit.	Turn main gun switch OFF.	Place safety switch in SAFE position.	Unlock brakes.
16. Observe sector with binoculars.	Observe sector.	Observe sector.	Observe sector.

PERFORMANCE MEASURE: MAIN GUN MULTIPLE ENGAGEMENT
- STATIONARY POINT TARGET -
(ENGAGEMENT 2 NBC)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT - - - 600 - 800MTRS	2 - TELFARE (Sim TPDS)	TIME: 30 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___
TANK FRONT SHOT - - - 600 - 800 MTRS	2 - TELFARE (Sim TPDS)	TIME: 30 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

* Total cumulative time to complete both engagements.

NOTE: Explain NO ratings for each crewmember.

COAX/CALIBER .50 SIMULTANEOUS ENGAGEMENT
- STATIONARY AREA AND MOVING POINT TARGETS -
(ENGAGEMENT 3A and 3B)

TANK COMMANDER	GUNNER	LOADER	DRIVER
1. COMMAND "DRIVER STOP-GUNNER." Simultaneously lay gun for direction.		Check turret ring for obstructions.	Slow speed of tank.
2. "COAX"	Turn ON machinegun switch. Index HEP in computer.	Place coax safety switch in the FIRE position.	Bring tank to a smooth halt.
3. "TROOPS	Look through unity window and find target.	Announce "UP."	Observe sector.
4. After Gunner announces "IDENTIFIED," command "FIRE AND ADJUST."	Upon seeing target, announce "IDENTIFIED."		Observe sector.
5. Insure cupola is unlocked.	Insure targets are within unity window of infinity sight. Announce "ON THE WAY" and fire.	Insure there are 3 to 4 inches of slack between receiver and ammunition box.	Observe sector.
6. Place cupola power switch in ON position. Place caliber .50 safety in the FIRE position. Insure rate of fire selector is on LOW (L) rate of fire.	Adjust fire so entire area is covered.		Observe sector.
7. Announce "CALIBER FIFTY."			Observe sector.
8. Lay rangeline leadline on center of mass of target.	Announce "TARGET-CEASE FIRE" after entire area is covered.	Place coax safety in SAFE position.	Observe sector.
9. Fire caliber .50 at point target.	Turn OFF machinegun switch.		Observe sector.
10. Announce "TC COMPLETE" after target is hit. Place caliber .50 safety in OFF position.	Observe sector.		Observe sector
11. Observe sector with binoculars	Observe sector.	Observe sector.	Observe sector.

PERFORMANCE MEASURE: COAX/CALIBER .50 SIMULTANEOUS ENGAGEMENT
- STATIONARY AREA AND MOVING POINT TARGETS -
(ENGAGEMENT 3A and 3B)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TROOPS					
- - -					
600 - 800 MTRS	100 - COAX	TIME: 30 sec*	___	___	___
		COVERAGE: 2/5 or MORE	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___
ATGM					
- - -					
800 - 1100 MTRS	50 - Caliber .50	TIME: 30 sec*	___	___	___
		COVERAGE: 1 or MORE TRACER THROUGH TARGET	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

* Total cumulative time to complete both engagements.

NOTE: Explain NO ratings for each crewmember.

MAIN GUN AND CALIBER .50
SIMULTANEOUS ENGAGEMENT
- STATIONARY POINT TARGET -
(ENGAGEMENT 4A AND 4B)

TANK COMMANDER	GUNNER	LOADER	DRIVER
1. Command "GUNNER." Simultaneously lay gun for direction.		Check turret ring for obstructions.	Slow speed of tank.
2. "TWO TANKS, RIGHT TANK FIRST."	Turn ON main gun switch.	Check path of recoil.	Bring tank to a smooth halt.
3. "SABOT"	Look through sight and find target.	Load announced ammunition.	Lock brakes and remove hands from controls.
4. Range to target.	Upon seeing target announce "IDENTIFIED."	Place safety switch in FIRE position and announce "UP."	Brace.
5. After Gunner announces "IDENTIFIED," command "FIRE AND ADJUST."	Place crosshairs at center of mass of target. Announce "ON THE WAY," and fire.	Brace.	Sense round.
6. Insure cupola is unlocked.	If round misses target announce sensing and "BOT" or "LOST."	Load second round.	Brace.
7. Place cupola power switch in ON position. Place cal. .50 safety switch in FIRE position. Insure rate of fire selector is on LOW (L) rate of fire.	Lay aiming point on target.	Announce "UP."	
8. Announce "CALIBER FIFTY."	Announce "ON THE WAY" and fire.	Brace.	Sense round.
9. Lay rangeline crosshair on center of mass of target.	Announce "TARGET" after target hit. Announce "LEFT TANK."	Load third round.	Brace.
10. Fire cal. .50 at stationary point target.	Place crosshairs at center of mass of target. Announce "ON THE WAY" and fire.	Announce "UP."	Sense round.

MAIN GUN AND CALIBER .50
SIMULTANEOUS ENGAGEMENT
- STATIONARY POINT TARGET -
(ENGAGEMENT 4A AND 4B)
(Continued)

	TANK COMMANDER	GUNNER	LOADER	DRIVER
11.	Announce "TC COMPLETE" after target hit. Place caliber .50 safety in OFF position.	If round misses target announce sensing and "BOT" or "LOST."	Load fourth round.	Brace.
12.	Observe sector with binoculars.	Lay aiming point on target.	Announce "UP."	
13.		Announce "ON THE WAY" and fire.	Brace.	Sense round.
14.		Announce "TARGET-CEASE FIRE." Turns main gun switch OFF.	Place safety switch in SAFE position.*	Unlock brakes.
15.		Observe sector.	Observe sector.	Observe sector.

*Loader reports "ALL SABOT EXPENDED," TC commands "LOAD HEAT - INDEX HEAT INTO COMPUTER."

PERFORMANCE MEASURE:

MAIN GUN AND CALIBER .50
SIMULTANEOUS ENGAGEMENT
- STATIONARY POINT TARGETS -
(ENGAGEMENT 4A and 4B)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT - - - 900 - 1000 MTRS	2 - TELFARE (Sim TPDS)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___
TANK FRONT SHOT - - - 900 - 1000 MTRS	2 - TELFARE (Sim TPDS)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___
MOVING BRDM - - - 800 - 1100 MTRS	50 - Caliber .50	TIME: 40 sec*	___	___	___
		COVERAGE: 1 or MORE TRACER THROUGH TARGET	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

*Total cumulative time to complete all engagements.

NOTE: Explain NO ratings for each crewmember.

MAIN GUN ENGAGEMENT
- MULTIPLE STATIONARY POINT TARGETS -
(Engagement 5)

	TANK COMMANDER	GUNNER	LOADER	DRIVER
1.	Command "GUNNER." Simultaneously lay gun for direction.		Check turret ring for obstructions.	Slow speed of tank.
2.	"BATTLESIGHT"	Turn main gun switch ON.	Check path of recoil. Place safety switch in FIRE position.	Bring tank to a smooth halt.
3.	"THREE TANKS, LEFT TANK FIRST."	Look through tank and find target.	Announce "UP."	Lock brakes and remove hands from steering controls.
4.		Upon seeing target announce "IDENTIFIED."	Prepare to load second round.	Brace.
5.	After Gunner announces "IDENTIFIED," command "FIRE" and sense round.	Place crosshairs at center of base of target. Announce "ON THE WAY," and fire.	Brace.	Sense round.
6.	If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load second round.	
7.		Lay aiming point on target.	Announce "UP."	Brace.
8.	Sense round.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
9.	Command "TARGET" after target hit and command "CENTER TANK".	Look through sight and find target.	Load third round and announce "UP."	Brace.
10.		Upon seeing target announce "IDENTIFIED."	Prepare to load fourth round.	
11.	After Gunner announces "IDENTIFIED," command "FIRE" and sense round.	Place crosshairs at center of base of target. Announce "ON THE WAY" and fire	Brace.	Sense round.
12.	If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load fourth round.	

MAIN GUN ENGAGEMENT
- STATIONARY POINT TARGETS -
(Engagement 5)
(Continued)

TANK COMMANDER	GUNNER	LOADER	DRIVER
13.	Lay aiming point on target.	Announce "UP".	Brace.
14. Sense round.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
15. Command "TARGET" after target hit and command "RIGHT TANK".	Look through sight and find target.	Load fifth round and announce "UP".	Brace.
16.	Upon seeing target announce "IDENTIFIED".	Prepare to load sixth round.	
17. After Gunner announces "IDENTIFIED", command "FIRE" and sense round.	Place crosshairs at center of base of target. Announce "ON THE WAY" and fire.	Brace.	Sense round.
18. If "LOST" give subsequent fire command.	If round misses target, announce sensing and "BOT" or "LOST".	Load sixth round.	
19. Command "CEASE FIRE" after target hit.	Turn main gun switch OFF.	Place safety switch in SAFE position.	Unlock brakes.
20. Observe sector with binoculars.	Observe sector.	Observe sector.	Observe sector.

PERFORMANCE MEASURE:

MAIN GUN ENGAGEMENT
- MULTIPLE STATIONARY POINT TARGETS -
(ENGAGEMENT 5)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT - - -					
400-600 MTRS	2 - TELFARE (Sim HEAT)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___
TANK FRONT SHOT - - -					
400 - 600 MTRS	2 - TELFARE (Sim HEAT)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

PERFORMANCE MEASURE:

MAIN GUN ENGAGEMENT
- MULTIPLE STATIONARY POINT TARGETS -
(ENGAGEMENT 5)
(Continued)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT					
- - -					
400 - 600 MTRS	1 - TELFARE (Sim HEAT)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

* Total cumulative time to complete all three engagements.

NOTE: Explain NO ratings for each crewmember.

INSTALL THE M24 (IR) PERISCOPE [DRIVER]

	Yes	No	NA
. Closed the Driver's hatch.	___	___	___
. Placed the Master Battery switch in the OFF position.	___	___	___
. Instructed crew member to rotate the turret so the gun tube is forward.	___	___	___
. Pulled periscope holder lid handle down with fingers of the left hand while pushing up on the lid latch with the thumb.	___	___	___
. Pushed upward and opened lid.	___	___	___
. Reached to rear of the seat and unlatched both catches on IR periscope stowage box.	___	___	___
. Removed the periscope from stowage box.	___	___	___
. Pulled up (rearward) on the elevation clamp and elevation clamp pivots.	___	___	___
. Loosened the jam nut on the front (forward) inside of the elevation clamp.	___	___	___
. Using both hands, position the periscope in the periscope holder.	___	___	___
. Pushed up on periscope until it locked in the holder. (Insured the periscope was locked in the holder before released.)	___	___	___
. Insured the elevation clamp is positioned in the periscope holder detent.	___	___	___
. Tightened the adjustment screw on front right hand inside of the elevation clamp until the elevation clamp was firmly seated in the periscope holder detent.	___	___	___
. Tightened the elevation clamp adjustment screw jam nut.	___	___	___
. Pushed elevation adjustment lever downward (forward) and locked periscope.	___	___	___
. Unscrewed dust cap from power receptable (center) location.	___	___	___
. Unscrewed power cable connecting plug from stowage receptable on right-hand side of compartment.	___	___	___
. Threaded power cable connecting plug into periscope receptacle and hand tightened.	___	___	___
. Installed the periscope without exposing it to direct sunlight.	___	___	___

PLACE THE M24 (IR) PERISCOPE INTO OPERATION [DRIVER]

	Yes	No	NA
. Turned the Master Battery switch ON.	___	___	___
. Placed the Blackout Selector switch in BO DRIVE.	___	___	___
. Turned the IR switch ON.	___	___	___
. Visually checked to insure IR Indicator lamp is lit.	___	___	___
. Turned the Lighting Control switch handle to the left.	___	___	___
. Pulled the elevation adjustment lever up.	___	___	___
. Adjusted periscope elevation angle to a comfortable position by moving periscope with both hands.	___	___	___
. Pushed elevation adjustment lever down to lock the periscope in position.	___	___	___
. As necessary, loosened the two inner wingnuts on the headrest until the proper eye distance is obtained, then retightened (handtight) both wingnuts.	___	___	___
. As necessary, bent headrest to fit head contour by pulling, pushing or twisting on each side of the headrest.	___	___	___
. Allowed periscope to warm up for 5 minutes before adjusting focus.	___	___	___
. Unscrewed left and right dust caps from bottom focus controls.	___	___	___
. Rotated left and right focus control knobs until the view through each eyepiece appears with maximum sharpness.	___	___	___
. Screwed left and right dust covers back over focus control knobs and tightened finger tight.	___	___	___

MAIN GUN AND CALIBER .50
SIMULTANEOUS ENGAGEMENT
- MULTIPLE STATIONARY POINT AND AREA TARGETS -
(ENGAGEMENT 6A AND 6B - RCLD-NBC-IR)

TANK COMMANDER	GUNNER	LOADER	DRIVER
1. Command "GUNNER - "DIRECT FIRE."		Check turret ring for obstruction.	Lock brakes and remove hands from steering controls.
2. Command "INDEX HEP - FIRE HEAT."		Remove HEP round and load HEAT round.	
3. Command "REDLIGHT - TWO TANKS - LEFT TANK FIRST - DEFLECTION SEVEN ZERO LEFT" (use actual deflection) - "1600 QUADRANT PLUS ONE SIX" (use actual rangecard quadrant).	Traverse main gun to announced deflection and reads back "DEFLECTION SEVEN ZERO LEFT." Elevates or depresses main gun to applied elevation, levels bubble and reads back "1600 QUADRANT PLUS ONE SIX." Indexes SABOT into computer and announces "SABOT INDEXED."	Check path of recoil. Place safety switch in FIRE position.	
4. Announce "TARGET ILLUMINATED."	Turn IR power switch on M32 periscope ON. Look through sight and find target.	Announce "UP."	Turn IR power switch on M24 periscope ON.
5. After Gunner announces "IDENTIFIED," command "FIRE AND ADJUST."	Upon seeing target announce "IDENTIFIED."	Prepare to load second round.	Brace.
6. Insure cupola is unlocked.	Place crosshairs at center of mass of target. Announce "ON THE WAY" and fire.	Brace.	Sense round.
7. Place cupola power switch in ON position. Place caliber .50 safety in FIRE position. Insure rate of fire selector is in LOW (L) rate of fire.	If round misses target announce sensing and "BOT" or "LOST."	Load second round.	Brace.

MAIN GUN AND CALIBER .50
SIMULTANEOUS ENGAGEMENT
- MULTIPLE STATIONARY POINT AND AREA TARGETS -
(ENGAGEMENT 6A and 6B - RCLD-NBC-IR)
(Continued)

TANK COMMANDER	GUNNER	LOADER	DRIVER
8. Announce "CALIBER FIFTY." Turn IR power switch on M36 periscope ON.	Lay aiming point on target.	Announce "UP."	
9. Lay rangeline crosshair on near edge of target.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
10. Fire caliber .50 at troop targets. Adjust fire so that entire area is covered.	Announce "TARGET" after target hit. Announce "RIGHT TANK."	Load third round.	Brace.
11. Announce "TC COMPLETE" after entire area is covered. Place caliber .50 safety in OFF position. Turn IR power switch OFF.	Place crosshairs at center of mass of target. Announce "ON THE WAY" and fire.	Announce "UP."	Sense round.
12. Observe sector.	If round misses target announce sensing and "BOT" or "LOST."	Load fourth round.	Brace.
13.	Lay aiming point on target.	Announce "UP."	
14.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
15.	Announce "TARGET - CEASE FIRE." Turn main gun switch OFF and turn IR power switch OFF.	Place safety switch in SAFE position.	Unlock brakes. Turn IR power switch OFF.
16.	Observe sector.	Observe sector.	Observe sector.

PERFORMANCE MEASURE:

MAIN GUN AND CALIBER .50
SIMULTANEOUS ENGAGEMENT
- MULTIPLE STATIONARY POINT AND AREA TARGETS -
(ENGAGEMENT 6A AND 6B - RCLD-NBC-IR)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT - - - 400 - 500 MTRS	2 - TELFARE (Sim HEAT)	TIME: 40 sec*			
		MAIN GUN HIT:			
		CREW DUTIES:			
		TC			
		GN			
		LD			
		DV			
TANK SIDE SHOT - - - 400 - 500 MTRS	2 - TELFARE (Sim HEAT)	TIME: 40 sec*			
		MAIN GUN HIT:			
		CREW DUTIES:			
		TC			
		GN			
		LD			
		DV			
TROOPS - - - 800 - 1000 MTRS	50 - Caliber .50	TIME: 40 sec*			
		COVERAGE: 2/5 or MORE			
		CREW DUTIES:			
		TC			
		GN			
		LD			
		DV			

* Total cumulative time to complete all engagements.

NOTE: Explain NO ratings for each crewmember.

MAIN GUN ENGAGEMENT
- STATIONARY AND MOVING POINT TARGETS -
(ENGAGEMENT 7 - FLARE)

TANK COMMANDER	GUNNER	LOADER	DRIVER
1. Command "GUNNER" and simultaneously lay gun for direction.		Check turret ring for obstructions.	
2. "BATTLESIGHT"	Turn ON main gun switch.	Remove HEP round and load SABOT round.	Lock brakes and remove hands from steering controls.
3. "TWO TANKS - LEFT TANK FIRST."	Look through sight and find target.	Check path of recoil. Place safety switch in FIRE position.	Brace.
4.	Upon seeing target announce "IDENTIFIED."	Announce "UP."	
5. After Gunner announces "IDENTIFIED" command "FIRE" and sense round.	Place crosshairs at center of base of target. Anounce "ON THE WAY" and fire.	Prepare to load second round.	Sense round.
6. If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load second round.	
7.	Lay aiming point on target.	Announce "UP."	Brace.
8. Sense round.	Announce "ON THE WAY" and fire.	Prepare to load third round.	Sense round.
9. Command "TARGET" after target hit and command "MOVING TANK."	Look through sight and find target.	Load third round and announce "UP."	Brace.
10.	Upon seeing target announce "IDENTIFIED."	Prepare to load fourth round.	
11. After Gunner announces "IDENTIFIED" command "FIRE" and sense round.	Place crosshairs leadline at center of base of target. Announce "ON THE WAY" and fire.	Brace.	Sense round.
12. If "LOST" give subsequent fire command.	If round misses target announce sensing and "BOT" or "LOST."	Load fourth round.	

MAIN GUN ENGAGEMENT
- STATIONARY AND MOVING POINT TARGETS -
(ENGAGEMENT 7 - FLARE)
(Continued)

TANK COMMANDER	GUNNER	LOADER	DRIVER
13.	Lay aiming point on target.	Announce "UP."	Brace.
14. Sense round.	Announce "ON THE WAY" and fire.	Brace.	Sense round.
15. Command "CEASE FIRE" after target hit.	Turn main gun switch OFF.	Place safety switch in SAFE position.	Unlock brakes.
16. Observe sector with binoculars.	Observe sector.	Observe sector.	Observe sector.

PERFORMANCE MEASURE: MAIN GUN ENGAGEMENT
- STATIONARY AND MOVING POINT TARGETS -
(ENGAGEMENT 7 - FLARE)

EXERCISE	NUMBER ROUNDS	RATING	YES	NO	NA
TANK FRONT SHOT - - - 600 - 700 MTRS	2 - TELFARE (Sim TPDS)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___
MOVING TANK SIDE SHOT - - - 600 - 800 MTRS	2 - TELFARE (Sim TPDS)	TIME: 40 sec*	___	___	___
		MAIN GUN HIT:	___	___	___
		CREW DUTIES:			
		TC	___	___	___
		GN	___	___	___
		LD	___	___	___
		DV	___	___	___

* Total cumulative time to complete both engagements

NOTE: Explain NO ratings for each crewmember.

DRIVE TO DEFILADE FIRING POSITION UPON ENEMY CONTACT
[DRIVER]

	Yes	No	NA
. Receive initial defilade firing position location orders from the Tank Commander.	___	___	___
. Receive final positioning instructions from the Gunner.	___	___	___
. Move the vehicle into the defilade position with front portion of the vehicle toward target (ideal position).	___	___	___
. Drive the vehicle into the position slowly and be prepared to move if necessary.	___	___	___
. Coordinate with the Tank Commander and the Gunner and position the vehicle as level as the terrain will permit.	___	___	___
. Bring the vehicle to a smooth and gradual halt.	___	___	___

PERFORM EVASIVE MANEUVERS UPON ENEMY CONTACT [DRIVER/TANK COMMANDER]

		Yes	No	NA
Tank Commander	. Direct Driver to appropriate covered and concealed hull-down routes and positions.	___	___	___
Driver	. Begin evasive maneuvers on own initiative when necessary.			
	- Look for hull defilade position.	___	___	___
	- Orient hull toward target.	___	___	___
	- Stop on command of TC.	___	___	___
	- Attempt to sense rounds.	___	___	___

APPLY IMMEDIATE ACTION TO REDUCE A STOPPAGE OF THE M219 MACHINEGUN [LOADER].

	Yes	No
. Wait 5 seconds to allow for a hangfire.	___	___
. Charge the machinegun, locking the recoiling parts to the rear.	___	___
. Check to insure that the ammunition is feeding into the weapon.	___	___
. Announce UP.	___	___
. Allow the Gunner to turn on the machinegun switch and attempt to fire. (If the machinegun fails to fire, the Gunner will turn off the machinegun switch and announce STOPPAGE.)	___	___
. Wait 5 seconds from the time the Gunner announces STOPPAGE.	___	___
. Remove the round from the chamber (within 5 additional seconds if the gun is hot) by:		
- Pulling the barrel extension to the rear;	___	___
- Placing the safety in SAFE;	___	___
- Raising the cover and removing the ammunition.	___	___
. Lift the feed tray.	___	___
. Look and feel in the chamber to insure that it is clear.	___	___
. Remove any obstructions which may be present (including a possible ruptured cartridge) case by:		
- Removing the receiver group;	___	___
- Removing the barrel;	___	___
- Inserting ruptured cartridge case extractor into the ruptured cartridge case from the receiver end;	___	___
- Inserting assembled, jointed cleaning rod through muzzle end of barrel; and	___	___
- Driving extractor and case from chamber.	___	___
. Place the safety in FIRE and hand function the weapon one cycle.	___	___
. Reload the weapon.	___	___
. Tell Gunner to attempt to fire the weapon.	___	___

PERFORM MISFIRE PROCEDURES FOR MAIN GUN [GUNNER/LOADER]

	Yes	No
Gunner . Announce MISFIRE upon failure to fire.	___	___
Gunner . Announce ON THE WAY and attempt to fire by depressing a firing trigger on the Gunner's power control handle that was NOT used to fire the round initially.	___	___
Gunner . Announce MISFIRE if gun again fails to fire.	___	___
Gunner . Announce ON THE WAY and attempt to fire by depressing the firing trigger on the Gunner's manual control handle.	___	___
Gunner . Announce MISFIRE if gun again fails to fire.	___	___
Gunner . Turn main gun switch OFF.	___	___
Gunner . Announce ON THE WAY and attempt to fire with the EMERGENCY FIRING DEVICE.	___	___
Gunner . Announce MISFIRE if gun again fails to fire.	___	___
Gunner . Wait two minutes and direct Loader to rotate the round 1/2 turn.	___	___
Loader . Open breech.	___	___
Loader . Rotate round 1/2 turn.	___	___
Loader . Close breech.	___	___
Loader . Announce UP.	___	___
Gunner . Turn main gun switch ON.	___	___
Gunner . Announce ON THE WAY and attempt to fire by depressing one of the electrical firing triggers.	___	___
Gunner . Announce MISFIRE if gun again fails to fire and wait two minutes for a hangfire.	___	___

REMOVE MISFIRED MAIN GUN ROUND	Yes	No
Gunner . Turn Main Gun and Turret power switches OFF.	___	___
Loader . Place safety in SAFE.	___	___
Loader . Open breech.	___	___
Gunner . Insert ramming and extracting tool between the face of the breech and rim of the cartridge.	___	___
Loader . Hold breech operating handle down.	___	___
Gunner . Pry round out of chamber.	___	___
Loader . Return breech operating handle to latched position.	___	___

DETERMINE CORRECTIVE ACTION REQUIRED BY REPLENISHER TAPE [LOADER].

	Yes	No
. Check replenisher assembly indicator tape before and during main gun engagements.	___	___
. Take the appropriate corrective action given any of the following conditions of the tape:		
- One rough edge and one smooth edge - normal condition.	___	___
- Rough edges on both sides - add oil to replenisher before and during firing.	___	___
- Smooth edges on both sides - drain oil from the replenisher before firing; level is satisfactory during firing but observe tape closely.	___	___
- Two long notches - drain oil from replenisher before and during firing.	___	___

APPLY IMMEDIATE ACTION TO REDUCE STOPPAGE OF M85 MACHINEGUN [TANK COMMANDER]

	Yes	No	NA
. Waited 5 seconds to allow for hangfire.	___	___	___
. Charged the machinegun locking recoiling parts to the rear.	___	___	___
. Checked to see if ammunition was feeding into machinegun.	___	___	___
. Attempted to fire weapon.	___	___	___
. Charged the machinegun to sear position.	___	___	___
. Rotated safety to SAFE (S).	___	___	___
. Raised cover and removed ammunition.	___	___	___
. Removed misfired round from chamber.	___	___	___
. Rotated safety to FIRE (F) and hand functioned the weapon one cycle.	___	___	___
. Reloaded the weapon.	___	___	___
. Attempted to fire weapon.	___	___	___

SENSE ROUNDS [TANK COMMANDER/GUNNER/LOADER]

	Yes	No	NA
. Announced correct deflection sensing as:			
LEFT or	___	___	___
RIGHT or	___	___	___
LINE	___	___	___
. Announced correct range sensing as:			
OVER or	___	___	___
SHORT or	___	___	___
DOUBTFUL or	___	___	___
TARGET	___	___	___

APPLY MAIN GUN ADJUSTMENT [GUNNER]

	Yes	No	NA
A. APPLY BOT			
After Gunner has fired:			
. Relays to maintain correct initial sight picture. (Notes point of sight reticle where tracer appears in relation to target.)	___	___	___
. Announces OVER-RIGHT-BOT (or other appropriate sensing.)	___	___	___
. Moves imaged tracer point on reticle, by gun controls, to center of mass of target.	___	___	___
. Announces ON THE WAY.	___	___	___
B. APPLY TARGET FORM			
After Gunner has fired, and "TC" has announced "OVER-DROP ONE HALF FORM-FIRE:			
. Moves sight reticle down by gun controls half the distance of the visible height of the target vehicle.	___	___	___
. Announces ON THE WAY.	___	___	___
C. APPLY STANDARD ADJUSTMENT			
After Gunner has fired and announced OVER:			
. Moves sight reticle down 1 mil by gun controls.	___	___	___
. Announced ON THE WAY.	___	___	___

ISSUE SUBSEQUENT FIRE COMMAND [TANK COMMANDER]

	Yes	No	NA
If Gunner is unable to make own adjustment the Tank Commander:			
. Announces alert element (sensing) as LEFT or RIGHT or LINE or OVER or SHORT or DOUBTFUL or TARGET.	___	___	___
. Announce deflection correction element as RIGHT or LEFT THREE MILS (or whatever is the number of mils).	___	___	___
. Announce range correction element as ADD or DROP TWO MILS (or whatever is the number of mils) or ADD or DROP ONE HALF FORM.	___	___	___
. Announce execution element as FIRE or AT MY COMMAND-FIRE.	___	___	___

PERFORM DURING-OPERATIONS MAINTENANCE CHECKS AND SERVICES ON STEERING, ACCELERATOR, SHIFT AND BRAKE CONTROLS [DRIVER].

	Yes	No
. Check for binding or excessive play in the linkage or any ususual characteristics in the controls.	___	___
. Note deficiencies as faults on DA Form 2404.	___	___

PERFORM DURING-OPERATION CHECKS ON INSTRUMENTS, GAGES AND WARNING LIGHT [DRIVER].

	Yes	No
. Check to insure Engine Oil Pressure gage is at a minimum of 15 PSI at 750 RPM.	___	___
. Check the Engine Oil Temperature gage for a reading of 180° to 225° F.	___	___
. Check Transmission Oil Temperature gage for a reading of 200° F to 280° F.	___	___
. Check Transmission Oil Pressure gage for a reading of 8 PSI to 40 PSI (2 PSI at 750 RPM).	___	___
. Check BATTERY/GENERATOR indicator for a reading in the green band.	___	___
. Check the Power Plant Warning Lamp to insure it is OFF.	___	___
. Check the Master Battery indicator light to insure it is lit.	___	___
. Check the tachometer to insure it gives a steady indication.	___	___